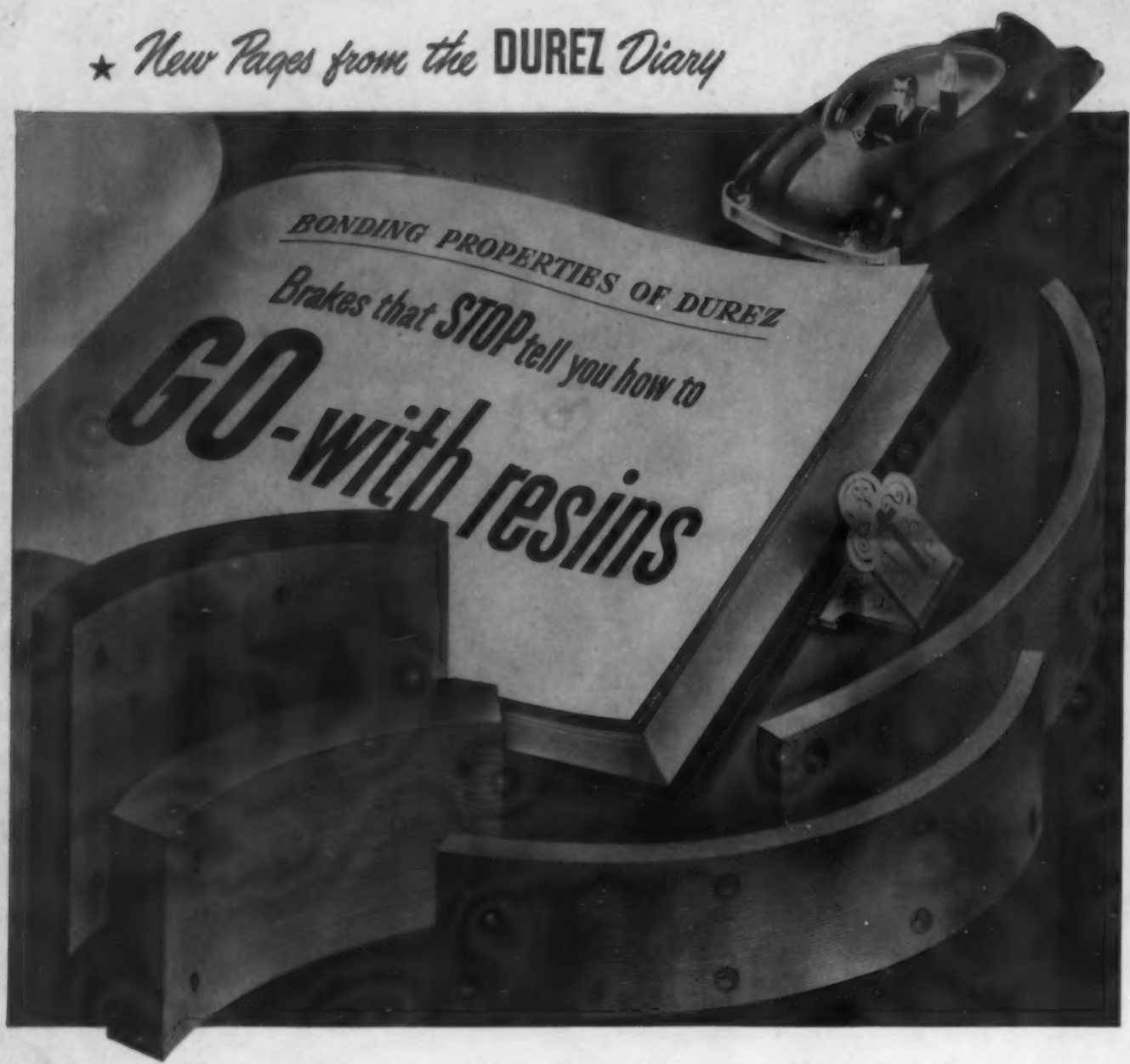
MODERN PLASTICS

MAY 1947

★ *New Pages from the* **DUREZ** *Diary*



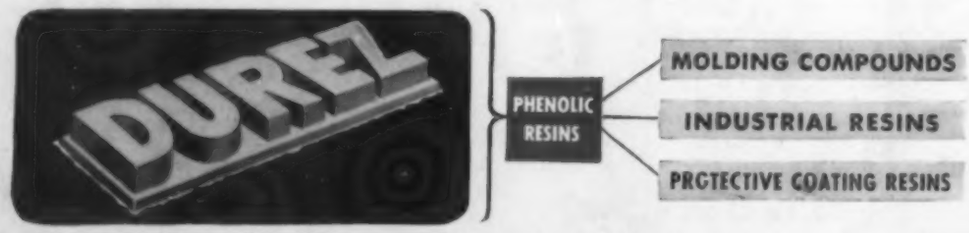
You take stopping for granted—your own and the other fellow's—in cars, trucks, buses, aircraft. And well you may.

But Durez doesn't. Because Durez produces the phenolic resins that bond the materials of brake linings, brake blocks, and clutch facings into a unified whole, we feel a responsibility with manufacturers to pursue without letup our search for improvements.

You may be surprised to know in how many ways Durez bonding agents enhance the performance of the complete product. In brake linings, Durez adds measurably to frictional characteristics, heat resistance and wearing quality. It augments imperviousness to water, oil, and grease, and in certain types of linings it even reduces the tendency of brakes to "fade."

The versatility of Durez industrial resins is no less valuable elsewhere. In grinding wheels their high strength and heat resistance permit higher speeds and faster cutting. Their dielectric strength and resistance to solvents, mild acids, and alkalies have solved problems in the electrical, plywood, and other industries.

We have prepared a brief, informative study to show you the numerous directions in which manufacturers are breaking new ground with these industrial resins . . . and the reasons why. We'll gladly mail you a copy. Write for "Durez Industrial Resins." Durez Plastics & Chemicals, Inc., 55 Walck Road, North Tonawanda, New York.



PHENOLIC PLASTICS THAT FIT THE JOB

TIME TELLS... *Catalin* SELLS!

There are many plastics, but there is only *one* Catalin — *the gem of plastics!* Down through the years hundreds of new materials have made their appearance, yet within its own sphere Catalin remains supreme. Catalin adapts itself perfectly to modern styling, its color has a natural flowing texture that can only be obtained by the casting process through which it is produced . . . deep, rich, satisfying color that is an intrinsic part of the material . . . unrivalled lustre and brilliance, and a charm of surface that will forever remain radiant and enchanting.

Clocks cased in Catalin become distinguished accessories to gracious living, always exquisitely correct, with a style and beauty as up-to-the-minute as the time on the dial. Book ends, desk and table pieces, and a host of other appointments that add color and charm to the home, when cloaked in Catalin bring an enduring pride in ownership . . . the most commonplace object becomes a treasured possession.

In the field of beauty, the range of Catalin is limitless! For this reason the scope of Catalin continues steadily to increase. Highly developed casting techniques now make it possible for product designers to plan freely in all three dimensions. Tooling costs are low, without recourse to expensive custom mold costs. No other thermosetting material can match its rich flowing color or speed of availability.

With an allure rivalling that of rare and semi-precious stone, Catalin gives your product a *desirability* that will add immeasurably to its sales appeal. A get-together with our service staff will quickly reveal how you can plan *telling selling* with Catalin. Inquiries invited!

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ONE PARK AVENUE • NEW YORK 16, N. Y.

CATALIN
THE GEM OF PLASTICS
Catalin

CAST RESINS • LIQUID RESINS • MOLDING COMPOUNDS

MODERN PLASTICS

VOLUME 24 MAY 1947 NUMBER 9

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"EXECUTIVE and EDITORIAL OFFICE: 122 E. 42nd St., New York 17, N. Y. Published the 20th of preceding month by Modern Plastics, Inc., at Publication Office: Twentieth and Northampton Sts., Easton, Pa. Entered as second class matter, May 28, 1940, at the Post Office at Easton, Pa., under the act of March 3, 1879." Subscription $5.00 a year, $8.00 for two years in U. S., its possessions and South America. Canadian subscriptions $5.50 per year. All other countries $6.00 per year, payable in New York funds.

Fishing shirt manufactured by Archer Rubber Company.

Picture of a dry fly fisherman

Storm-proof fishing shirt is another interesting application of GEON raw materials

IT'S the fisherman that's dry in this case—not the fly. That's because he's wearing a new kind of fishing shirt—fabric with a tough coating made from one of the GEON polyvinyl resins. Thanks to the coating the shirt is completely waterproof. It resists the aging effects of sun and rain and air. He can wear it through the brush along the bank and it won't scuff. When he gets home he can roll the shirt into a ball and throw it in the corner of the closet. When he gets it out again it'll be as good as new—no sticking, no cracking, even when rolled up wet.

These and many other important properties may be found in a wide variety of products made from GEON. Such products can be made to resist oils, greases, foods, chemicals, heat, cold, mildew, and many other normally destructive factors. They may be brilliantly or delicately colored—clear or opaque—flexible or rigid. Processing methods include pressure or injection molding, calendering or casting sheet or film, solution or latex coating and impregnating, and extruding.

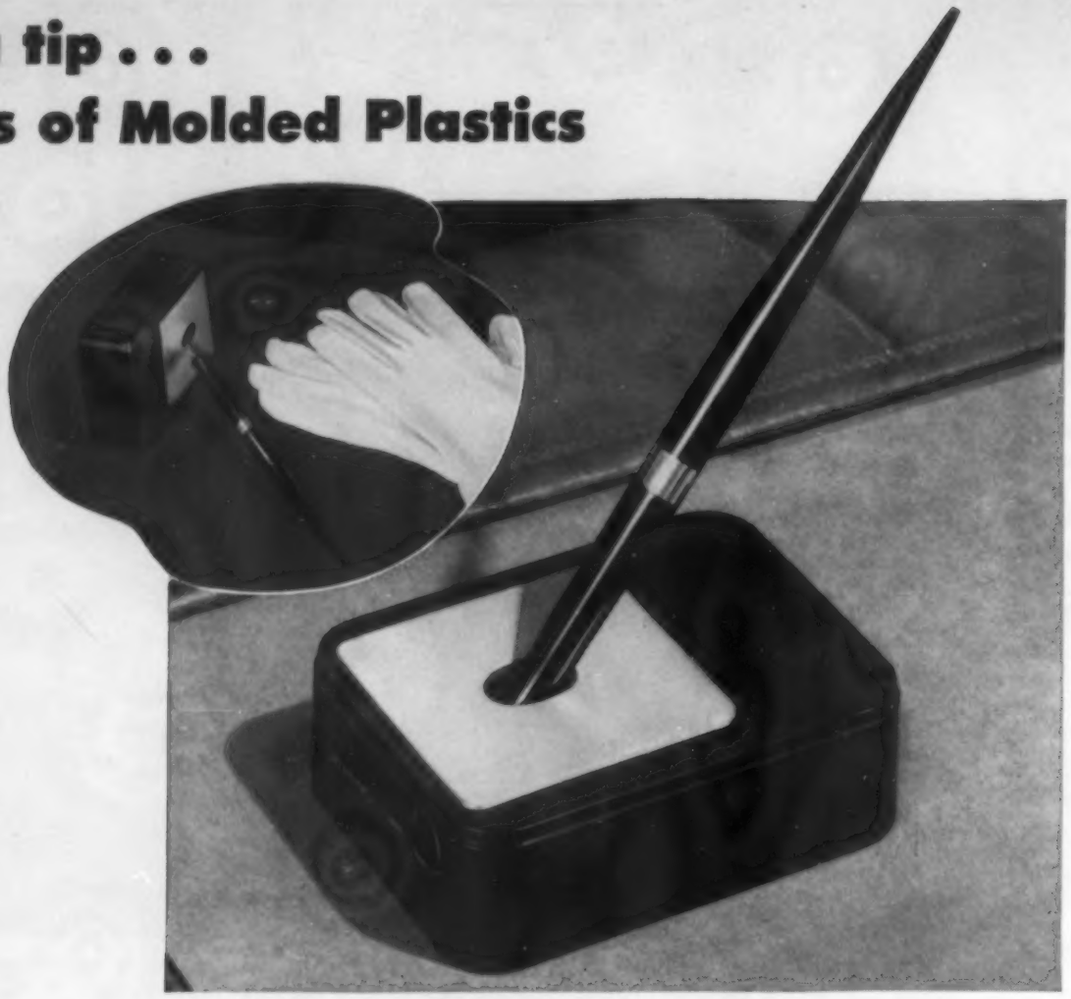
Other raw materials made by B. F. Goodrich Chemical Company include HYCAR American rubber, KRISTON thermosetting resins, and GOOD-RITE chemicals. While we make no finished products from any of these materials, we'll be glad to help with special problems or applications. For more information please write B. F. Goodrich Chemical Company, Dept. O-5, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

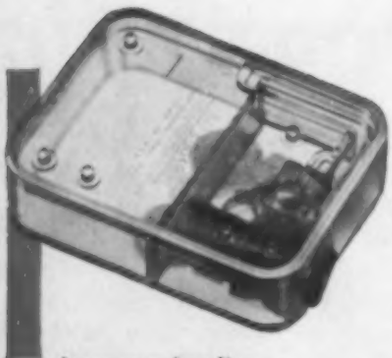
B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Here's a tip . . .
for users of Molded Plastics





In order to merchandise this new item properly a quantity of the bases were molded wholly of transparent material. This permits a clear view of all parts. These units are being used to explain and demonstrate the revolutionary "Safeguard" principles to the trade.

Tip the base of this new Sheaffer "Safeguard" Dip-Type Desk Set on its side . . . stand it on either end . . . turn it over, bottom up. The chances of spilling are negligible. Here is another notable contribution to writing ease and pleasure, thanks to Sheaffer engineering . . . and to Chicago Molded Plastics.

Naturally, the requirements for the plastics base parts of the "Safeguard" Desk Set were exacting . . . fine appearance to match Sheaffer quality; accuracy, for ease of assembly and proper functioning; and dependable production, to keep up with the demand created by Sheaffer's national advertising. So the job was placed with Chicago Molded . . . tools were designed and fabricated by CMPC . . . and parts injection molded of polystyrene in CMPC's spacious, fully equipped Thermoplastics Division.

Your requirements are, perhaps, vastly different. But this job is, we believe, another example of the ability of CMPC . . . the knowledge, experience, and facilities . . . to meet the requirements of 'most any molded plastics job.

So . . . whatever your plans call for . . . thermoplastic materials or thermosetting . . . injection molding or compression . . . large parts or small . . . you'll find it worthwhile to discuss them with a CMPC Service Engineer. There's no obligation.

CHICAGO MOLDED PRODUCTS CORPORATION

1046 N. Kolmar Ave. **Chicago 51, Illinois**

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COMPRESSION *and* **INJECTION** *molding of all plastic materials*

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A marketing model for plastics

The arrival of the Second Annual Plastics Exhibition comes at a propitious moment in the history of the industry. The industry is about to become involved in a big way in its next forward step—the art of marketing in a buyers' market. From now on customers will be choosier. Many of them are prejudiced against plastics because of unhappy experiences in the past. The reason for those sad experiences was in most cases an improper application, dowdy workmanship or a lack of knowledge by the buyer as to what he could expect from plastics used.

The latter point, lack of knowledge by the consumer, is one we want to discuss here. The housing and construction field is a pertinent example. Everyone with a spark of imagination believes that the outlets for building materials and home furnishings is going to be tremendous for a considerable number of years. Yet there is almost no coordination between the construction and plastics industries. Builders and architects seldom know what plastics can do for them and the plastics industry has admitted a limited technical knowledge of what the construction and home building industries require.

Architects insist that they are sorely in need of movable self-supporting partitions; basic, standard insulated panels as simple to handle as a 4 by 8 ft. plywood sheet; wall surfacing for corridors, halls, public rooms and similar applications; treated fabrics to replace tile; better lighting fixtures; new ideas in hardware—not doohickies, but well designed appurtenances that have style and refreshing appeal as well as utility. Doors, trim, sills are all ripe for modernization by ingenious architects, many of whom are on the scent of plastics, but haven't been able to tree their quarry. They understand such things as decorative laminates, extruded molding, vinyl floor or wall coverings and the more conventional plastics applications but in general the architects have had to discover and experiment with these items with but little aid from the plastics industry.

In the lesser known fields such as sandwich-core materials and polyester treatments, builders and architects are fumbling in the dark with materials about which they have heard a great clamor but have had precious little opportunity to evaluate. It seems strange indeed that these two new plastic materials with promising futures—both of them ready for market in the opinion of many experts—yet still in cold storage because the customers who could use them best have had almost no opportunity to become familiar with their properties and possibilities.

Because of the potential value of such products to the building field it is likely that study by a group of informed architect-designers would result in helpful suggestions to the plastics industry. The relation of the resin producers to the building field could be like their relation to the Government in war product development when such things as the proximity and mortar fuses were developed by close cooperation between maker and user. It is even possible that they could recommend uses of plastics for the great new United Nations buildings where all the world could see them applied in the most modern and utilitarian methods.

SOMETHING NEW IN SCENT'S APPEAL

Perfume package of Du Pont "Lucite" paves the way to new sales

If you're a business man, designer, engineer or retail buyer, you're invited to visit the Du Pont exhibit at the Second National Plastics Exposition, May 6-10, The Coliseum, Chicago, Ill.

Once again the plastics industry will display its combined achievements to all industries. At the Du Pont exhibit you will see Du Pont Plastics on colorful display, including completely new developments. Write E. I. du Pont de Nemours & Co. (Inc.), Arlington, N. J., for a ticket of invitation.

"LOVELY!" WOMEN SIGH...and men buy! They're stopped by the diamond-like brilliance and dramatic beauty of this new perfume package...made of Du Pont "Lucite".

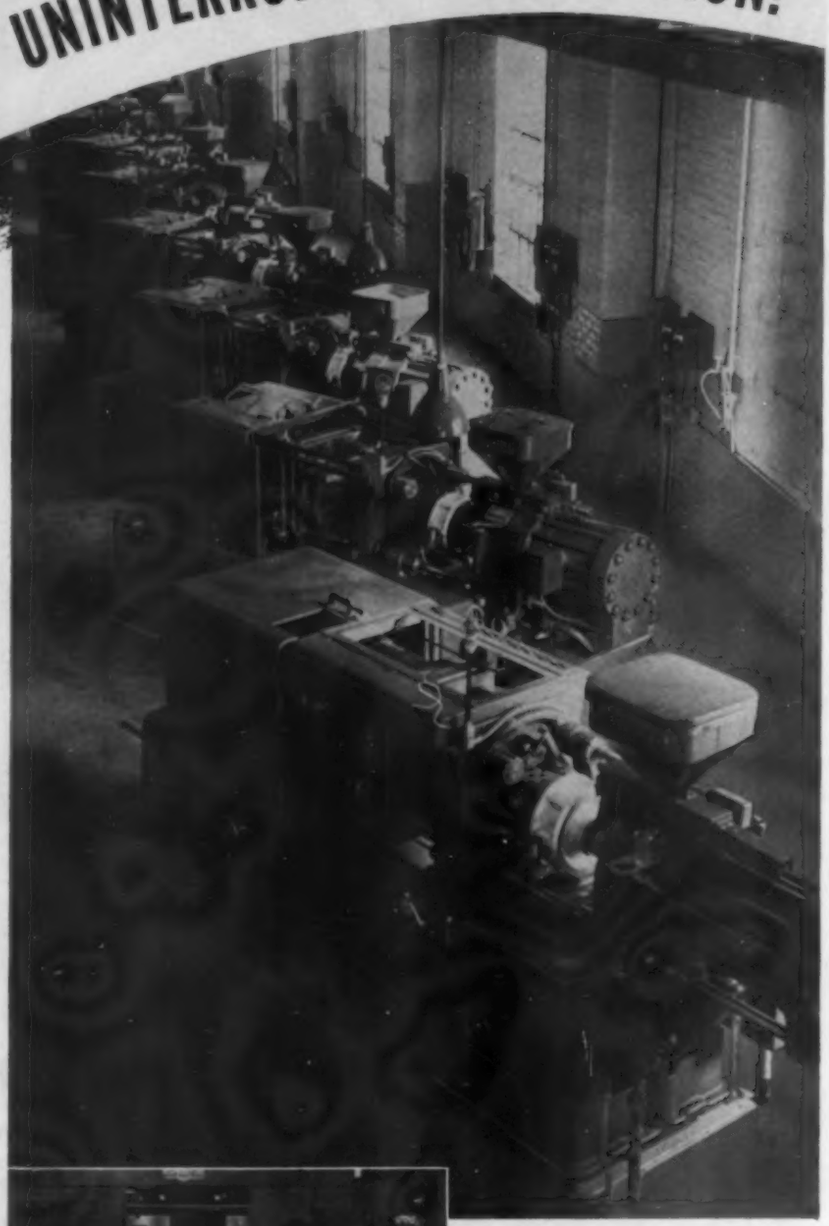
In planning the introduction of a luxurious perfume, Matchabelli designed this unusual faceted package to take full advantage of the crystal clarity, light weight, durability, and protective qualities of "Lucite".

For packages, "Lucite" acrylic resin gives shatter-resistance and crystal clarity in many colors; its ability to edge-light permits unusual illumination effects. "Lucite" recommends itself for a host of other uses, too, because it has good tensile and flexural strength, is chemically inert and can be easily and economically fabricated.

Investigate the properties of "Lucite"...and other Du Pont plastics. You may find a way to develop a new product, or a means of improving an old one. Write now for liturature. It will pay you to have it in your files. E. I. du Pont de Nemours & Co. (Inc.), Room 365, Arlington, New Jersey.

Prince Matchabelli perfume package, made by Industrial Conversions, Inc., New York, N. Y., was awarded the Beauty Fashion Award for 1946.

HERE'S PROOF OF UNINTERRUPTED PRODUCTION!



Illustrated above is an installation of Reed-Prentice plastic injection molding machines, comprised of eight 10D-8 Oz. and one 10H-22 Oz. models located in the modern and progressive plant of the Mastro Plastics Corporation of New York City. They are engaged in the mass production of plastic clothes pins as shown in the smaller view. These machines are in operation 24 hours a day, 6 days a week, utilizing their full capacity.

The management states, "Excellent results . . . no unfilled molds . . . mold is designed to the limit of capacity, without stinting. In addition to the high productivity of these machines, we find that one of the outstanding benefits is the small amount of maintenance required, thus eliminating 'down' time, assuring uninterrupted production."

On long, uninterrupted runs or shorter, varied runs, the many features of Reed-Prentice machines mean greater profits for you! Models are available in 4, 6, 8, 12, 16 and 22 Oz. capacities. Write Dept. D for full information.

SEE THE REED-PRENTICE PLASTIC INJECTION MOLDING MACHINE in operation at the SECOND NATIONAL PLASTIC EXPOSITION CHICAGO - May 6-10 Booths 17-18-19

INJECTION
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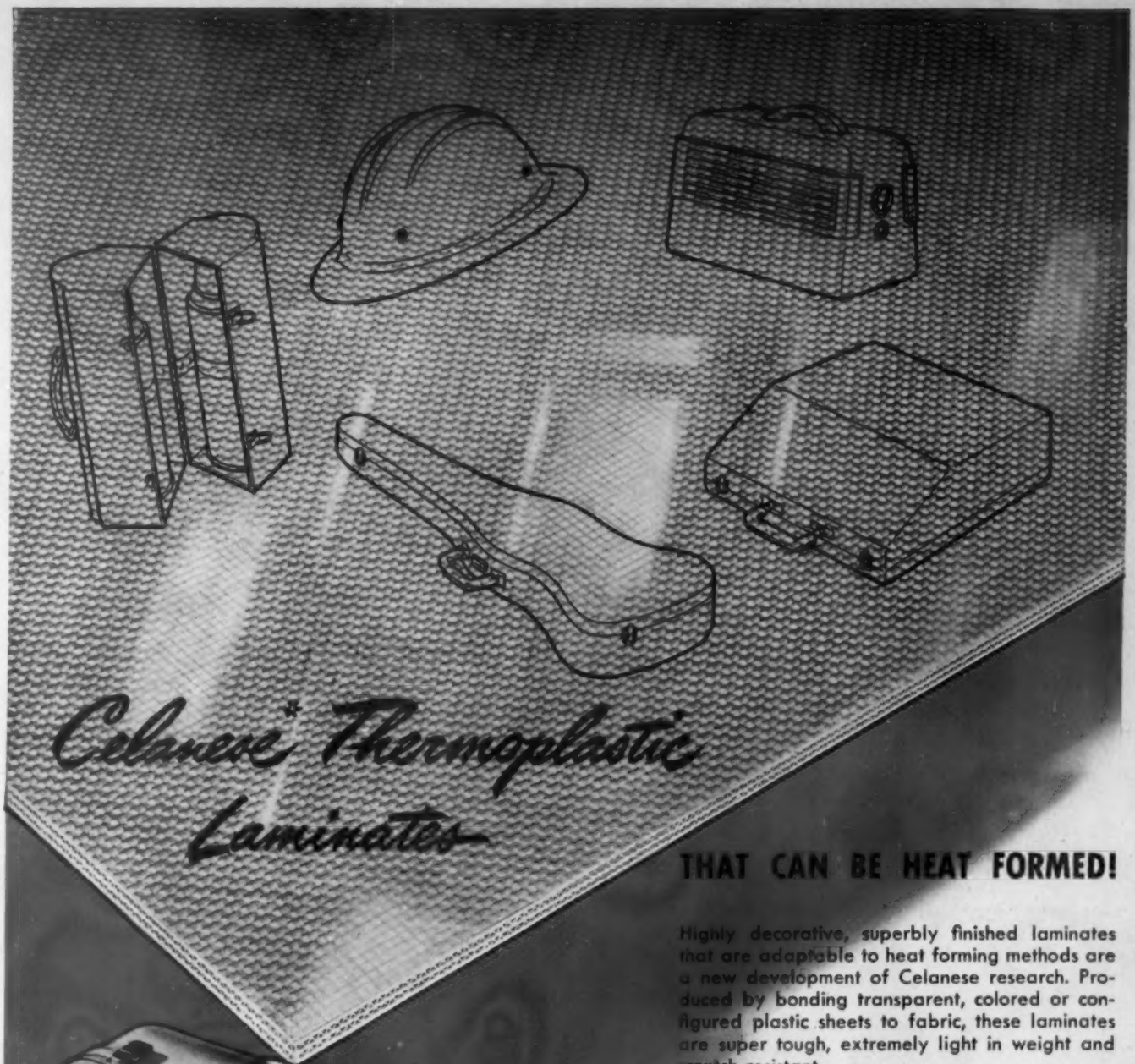

Celanese* Thermoplastic Laminates

THAT CAN BE HEAT FORMED!

Highly decorative, superbly finished laminates that are adaptable to heat forming methods are a new development of Celanese research. Produced by bonding transparent, colored or configured plastic sheets to fabric, these laminates are super tough, extremely light in weight and scratch-resistant.

These laminates promise a wide range of usefulness in products of all types. Their ability to be shaped by heat and pressure makes them feasible for product applications barred to laminates made with thermosetting materials.

A FEW SUGGESTED APPLICATIONS

Luggage
Interior Automobile Paneling
Baby Coach Paneling
Sports Equipment
Musical Instrument Cases
Typewriter Cases
Aircraft Cabin Wall Liners
Trunk Liners
Vacuum Bottle Cases
Camera Cases
Radio Cabinets

The Product Application Department—through your Celanese representative—can supply you with latest information about this Celanese development. Plastics Division, Celanese Corporation of America, 180 Madison Avenue, New York 16, N. Y.

LUMARITH* **FORTICEL*** **CELLULOID***
VIMLITE* **CELCON†**

*Reg. U. S. Pat. Off. †Trademark

Celanese* Plastics

Skyrider

Compression Molding

OF THINGS TO COME . . .

The world of tomorrow will behold innovations in product design that are but dreams today. Whether you are seeking a new table radio design or production of your own design, think of *International Molded Plastics Inc.* for quality molding.

INTERNATIONAL MOLDED PLASTICS, INC.

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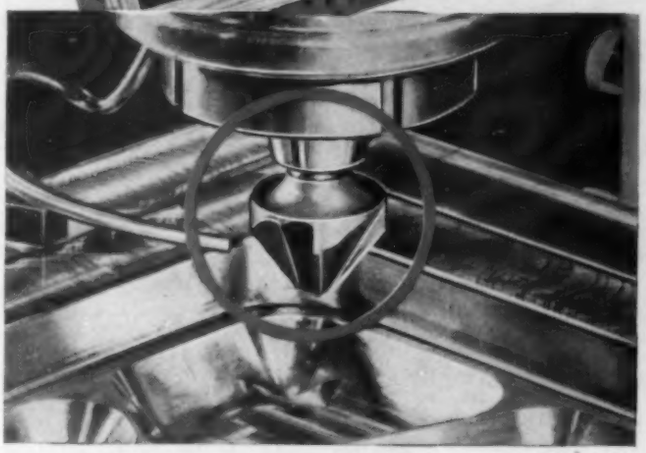
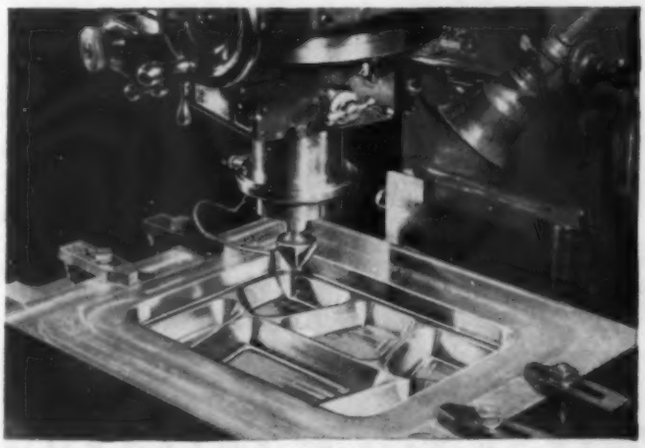
How One Machine Scribed and Machined this Complex Mold— and Made its Own Cutters!



1 **FAST!** The job, a plastic serving tray, required special angles and radii in its cavities. The Model 2D Rotary Head milling machine — a Kearney & Trecker development — completely milled the 3 special form cutters to correct size and shape, including relief and chip clearances.

2 **DIRECT!** The operator accurately located the mold blocks in relation to the Rotary Head center. All layout work, rough and finish milling then were completed with one clamping of the workpiece. No models or templets were required. The blueprint was the only guide necessary.



3 **ACCURATE!** Completing the work in a single setup greatly reduced the chance for error. Precision measuring devices and complete control of all combinations of cutter movements, both angular and radial, made this a simple job of geometric construction for the operator.

4 For more facts of how you can get Fast, Direct, Accurate results on other mold, tool, die, pattern, toolroom and general production work, using the Rotary Head Method, write for bulletin 1002C on the Model 2D Rotary Head Milling Machine.

KEARNEY & TRECKER CORPORATION
MILWAUKEE 14, WISCONSIN

4720

"Got a Plastic Cell, Judge?
I'm Used to Only the Best."

. . . and maybe you are used to using only the best materials available for the products you manufacture. If so, and if it's plastics your needing, wouldn't it be a good idea to call in one of the best plastic molders for the job?

Our group out at Boonton won't stick their chests out so far as to claim they're the best. But, they have been molding good plastic parts for twenty-five years and that's a long time in the plastics industry.

During that time, of course, Boonton has done a lot of molding for a lot of companies. And, a lot of people have been pretty pleased about the whole matter.

There's a good chance that we can please you, too. Why not find out?

If it can be Molded, Boonton can Mold it—We Hope

FOR OVER 25 YEARS
CUSTOM ENGINEERS
OF MOLDED PLASTICS

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MOLDERS OF MOST PLASTICS BY MOST METHODS

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FACTORY—BOONTON, New Jersey

FROM A TO Z

H-P-M Injection Molding Machines answer your production problems

Hawk Model Company, Chicago, gets 120 plastic letter sets per hour from their H-P-M 4-oz.

See how perfectly these characters fill out on an H-P-M Injection Molding Machine . . . 36 letters and numerals in a single shot. Tiny model airplane propellers and solid plastic panels with a 64 square-inch projected area . . . each is produced with equal efficiency.

What's YOUR Problem?

Large products or small, they can be made cheaper, faster, better with H-P-M Molding Machines! For each H-P-M unit is a high speed, low cost, quality producer! Each is completely self-contained . . . connect it to electric power and cooling water and it's ready to go!

Call the nearby H-P-M office or representative, or write direct. Trained engineers will give you their recommendations promptly. There's no obligation.

Bulletin 4701 describes the latest model H-P-M 4-ounce machine. Write today for a free copy.

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REVOLUTIONIZING PRODUCTION WITH HYDRAULICS SINCE 1877

A Better Finish

We Mold it Right Into Your Plastic Parts

A lot of plastics' sales-pulling power lies in its appeal to hand and eye. Improve the finish and you step up these appeals.

That's just what molding with Heatronics (radiofrequency pre-heating) does—improves the finish of almost any plastic part. It enhances appearance, brings out natural highlights of styling, improves development of gloss, and cuts down rejects caused by blistering. It gets these results to such an extent that, while there are no qualitative tests applicable, your own hands and eyes tell you "They're there"!

Heatronics are responsible for many other improvements, too—things like more uniform density, less internal stress, better control of inserts. And others. Enough to merit consideration for almost any job today.

Plastic Pre-form in Heatronics Applicator for Radiofrequency Pre-heating.

At Kurz-Kasch, our extremely extensive molding and heatronic equipment are both at your service. Better yet, so is our *experience* with each. In molding, that experience goes back to the birth of the industry—in heatronics, to the first use of it in plastics. It's valuable.

May we show you? Just ask for a Kurz-Kasch engineer.

Kurz-Kasch

For Over 30 Years Planners and Molders in Plastics

Kurz-Kasch, Inc., 1415 South Broadway, Dayton 1, Ohio. *Branch Sales Offices:* New York • Chicago • Detroit
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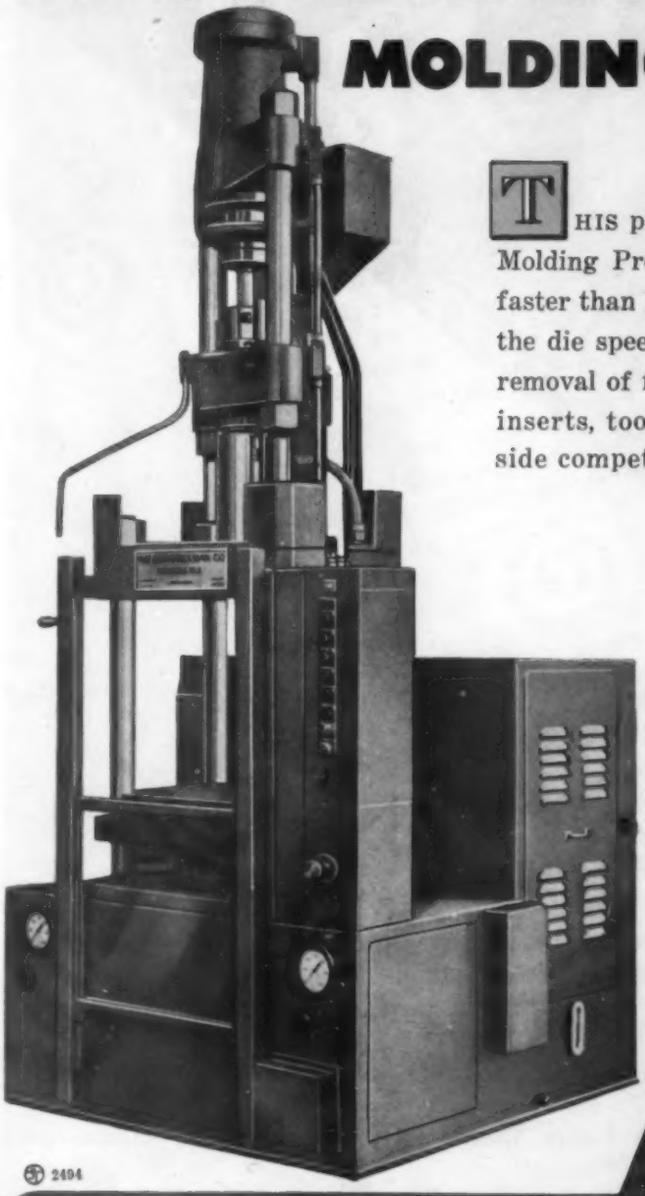
new WATSON-STILLMAN 4 OZ. VERTICAL INJECTION MOLDING MACHINE!

Shown for the first time at the Chicago SPI Show, May 6 to 10, Booth 516. Don't miss it!



THIS production-proved 4 oz. Vertical Injection Molding Press will handle any type of insert molding faster than horizontal machines. The horizontal plane of the die speeds up the placing of inserts, facilitates the removal of finished work. On injection molding *without* inserts, too, this press has proved faster in side-by-side competition with horizontal machines.

See this new Watson-Stillman molding press *in actual operation* at the SPI Show. Investigate its possibilities in your plant.

Watson-Stillman also manufactures a complete standard line of machinery for Horizontal, Injection, Transfer and Compression Molding; Tableting Machines, Hobbing, General Purpose, and Laboratory Presses. Get the complete story on Watson-Stillman equipment from the W-S representative at the SPI Show... Or write direct to The Watson-Stillman Co., Roselle, N. J.

2494

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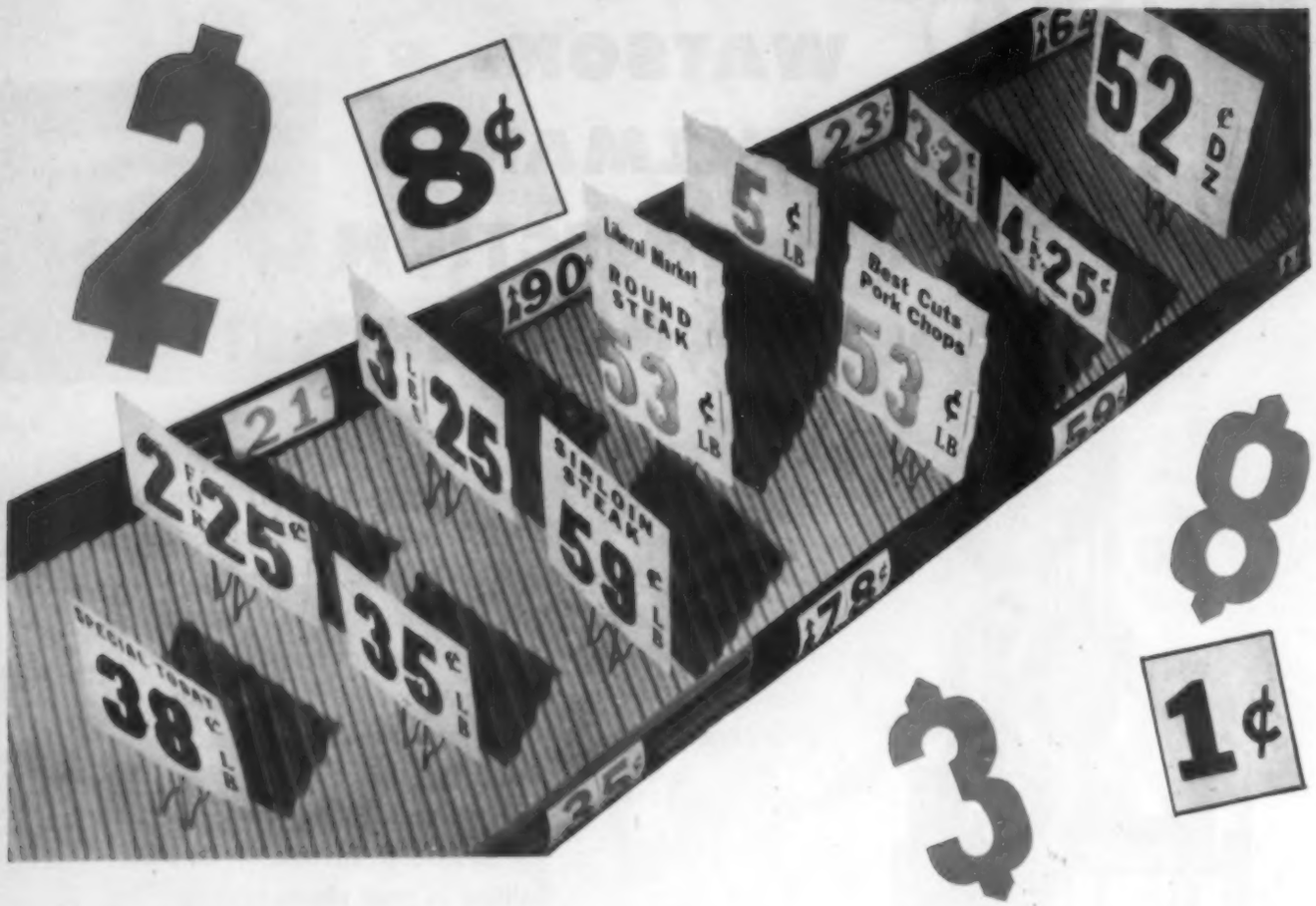

PRICES ON PARADE

Price Tags of NIXON C/N *have Buy-Appeal*

Shaw & Slavsky of Detroit, Michigan, make modern price marking systems for retail stores. Their tags and interchangeable die cut numbers are made from sheets of Nixon C/N (Cellulose Nitrate). It is easy to keep their high lustre finish clean and attractive. The bright colors of the die cut numbers are an integral part of the material. Just another use for Nixon Plastics which may suggest a solution to some problem of your own.

Nixon

C/N CELLULOSE NITRATE

C/A CELLULOSE ACETATE

E/C ETHYL CELLULOSE

Plastics

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We're quite excited about this new Plyon application: Plyon plus decorative cotton fabrics! This new process incorporates Plyon with fabrics of colorful design and pattern to produce the ideal material for
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It's the perfect means of brightening any interior, transforming living rooms, kitchens, club rooms, etc. The combination of bright designs and Plyon's well-known resistance to hard wear, to liquids, to most acids makes this the application for just about anything that must be both decorative and impervious to hard usage.
It's as simple as this: you submit your fabrics to us and we process them. Or, if you prefer, we will create special designs for you and go right into production on them. The best part about it is that there is no distortion, no change in the pattern; the fabric colors remain fast and become even more brilliant—are given a depth and lustre that heighten the effect indescribably.
Does this new Plyon application sound like what you're looking for? Send for samples—and tell us about your requirements.
Swedlow PLASTICS CO.
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* RICHARDSON MEANS *Versatility* IN PLASTICS

Another SHOT...Another MOLDED PART ...PERFECT as the ONE BEFORE!

Plastic molding is an art in itself... a skill which cannot be learned in a day. Richardson Plasticians have spent years acquiring the degree of knowledge necessary for this exacting work.

The result is obvious to any Richardson customer. For he sees that to mold correctly... is to mold uniformly. *And that means control every step of the way.*

That kind of control means:

Designing cavities so material will properly fill.

Building molds with correct shrinkage allowances.

Know-how and facilities to mold Beetle, Bakelite, Plaskon, Tenite, Styron, Durez and many more.

Careful attention to a hundred other details.

INSUROK *Precision Plastics*

***RESEARCH**
...a continuous transformation of possibilities into practical ideas in plastics.

***DESIGNING**
... Artistic visualization. Creative engineering. Practical planning for efficient plastics production.

***PRODUCTION**
... Complete machine shop facilities for manufacturing our own dies, molds, tools.

***LAMINATING**
... Sheets, rods, tubes. Standard NEMA grades; over 100 special grades.

***FABRICATING**
... Complete equipment for drilling, punching, sawing, turning, milling, etc.

The RICHARDSON COMPANY

Sales Headquarters: MELROSE PARK, ILL. FOUNDED 1858 LOCKLAND, CINCINNATI 15, OHIO

Sales Offices

NEW YORK 6, 75 WEST STREET
PHILADELPHIA 40, PA., 3728 NO. BROAD STREET
CLEVELAND 15, OHIO, 326-7 PLYMOUTH BLDG. • DETROIT 2, MICH., 6-252 G. M. BLDG. • ST. LOUIS 12, MO., 5579 PERSHING AVENUE
ROCHESTER 4, N. Y., 1031 SIBLEY TOWER BLDG.
MILWAUKEE 3, WIS., 743 NO. FOURTH STREET

Factories: MELROSE PARK, ILL. • NEW BRUNSWICK, N. J. • INDIANAPOLIS, IND.

ACRYLIC ENGINEERS!

That's the name that best describes us because that's what we are: a firm of expert acrylic fabricators serving industry in the new industrial centers of the West Coast—

a firm composed of men who are thoroughly versed in every phase and detail of acrylic fabricating—acrylic engineers!

For we handle solid industrial problems. No gadgets, no little decorative items—but the important fabricating problems of heavy industry, the ones with stubborn and complicated specifications—the problems that call for real engineering know-how.

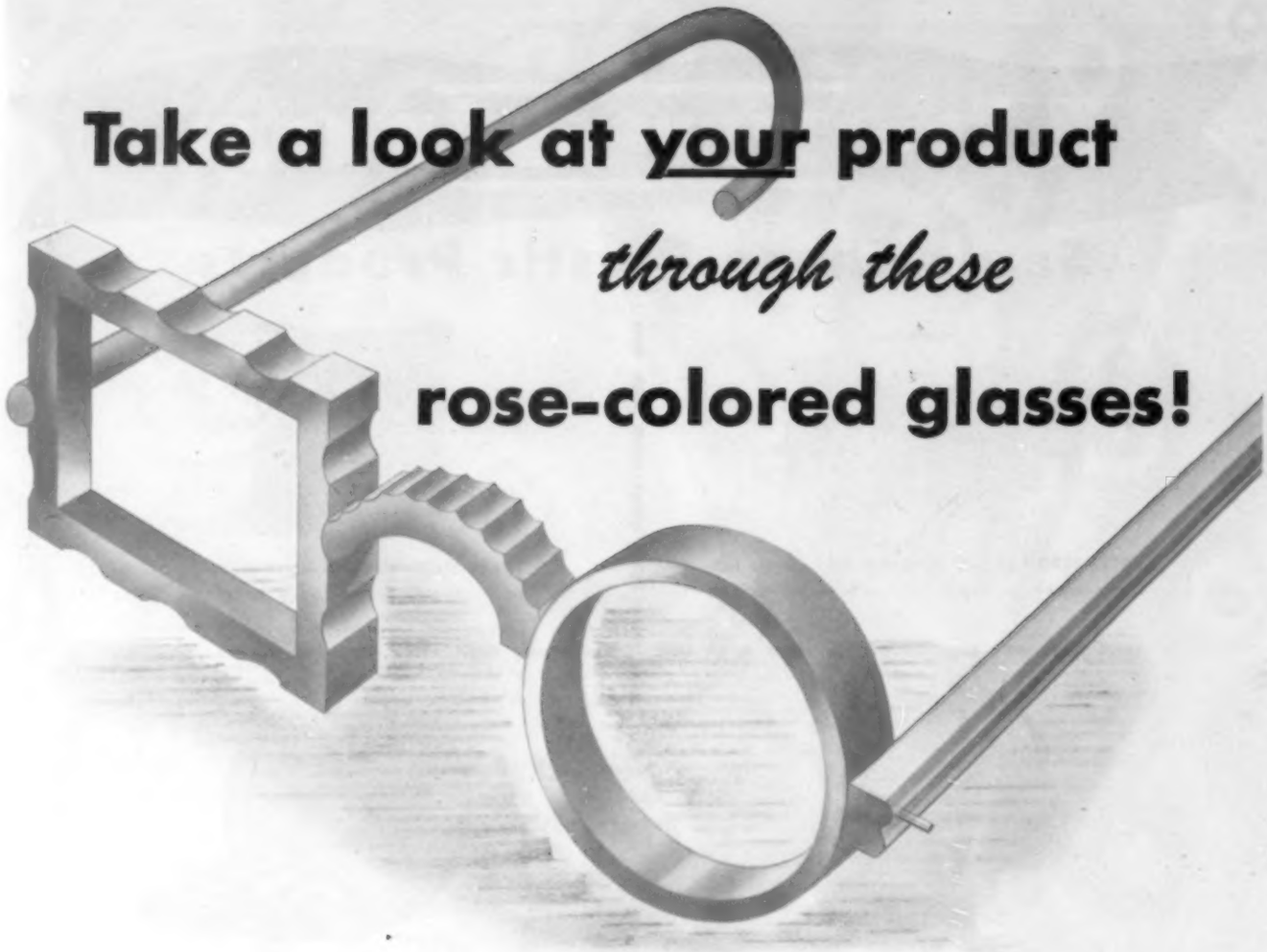
Problems like this fabricated acrylic lid, for instance, made to cover frozen-food merchandising units. An example of engineered fabricating at its best, this lid represents the solution to a problem calling for a sturdy, non-fogging, easily packaged and inexpensive cover for frozen food cabinets. Doming of the lid by deep drawing solved the strength problem and reduced fogging. We might mention that at K-Plastix the deep-draw process is one of the specialties of the house. We're expert at achieving unusual depths for exacting industrial requirements.

In fact, to sum up the way we feel about jobs like this one—darned if we'll be licked by a little piece of plastic!

Write today and tell us your requirements.

K-PLASTIX 580 Natoma Street, San Francisco 3, Calif.
UNderhill 4575

Take a look at your product *through these* rose-colored glasses!

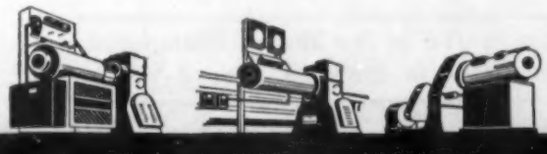


THE different plastics shapes making up these "glasses" are produced by extrusion. To get an entirely new viewpoint on *your* products' appearance, performance, and cost of production, look at them in terms of extruded shapes like these.

The shapes shown above are only typical; extrusion can give you a practically *limitless* variety of shapes, which can be cut, stamped, and bent to further widen the application of plastics extrusion to innumerable products.

Because plastics extrusion is a continuous process, product costs are comparatively low. Because extrusions have a naturally smooth finish, they require no additional buffing or polishing, and your products have a smarter, richer, more colorful appearance. Because NRM extruders have proved their dependability in meeting exacting tolerances, you are assured of uniformity in dimensions, required strength, degree of hardness or flexibility and other desired characteristics.

So, think of *your* products in terms of this modern, rapidly growing production method, and write NRM for complete information to meet your particular problem.



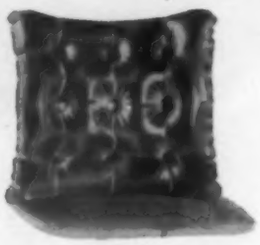
NATIONAL RUBBER MACHINERY CO.
General Offices: AKRON 8, OHIO

Plastics
MACHINERY DIVISION

Thermatron

Seals These Plastic Products

THERMATRON-SEALED swimming aid . . . now selling everywhere. Seams are air and water-tight.



THERMATRON-SEALED inflated pillow for beach or backyard. Seams strong as plastic itself.

THERMATRON-SEALED plastic patent handbag. Strong welded corners cannot break open.

THERMATRON-SEALED air-tight, water-tight plastic beach ball...now selling everywhere.

THERMATRON-SEALED Products Selling Everywhere!

Electronically sealed on the THERMATRON, these profitable plastic products are successfully meeting the toughest test of all . . . the test of selling, staying sold and selling again and again! These and hundreds of other THERMATRON-SEALED specialties and utilities can be seen in stores throughout the country.

THERMATRON-SEALED plastic products sell fast because their seams are water-tight, air-tight and strong as the plastic material itself.

Fast-selling plastic items are THERMATRON-SEALED because THERMATRON seals FAST . . . cuts unit production cost way down. With inexpensive changeable dies shaped to the outlines of your products, THERMATRON makes a rapid one-shot operation of sealing hundreds of industrial items, utilities and novelties.

Find out how THERMATRON'S broad experience with electronic sealing can help you. Have your vinyl materials THERMATRON-TEST-SEALED at no obligation. Write THERMATRON today! Address Dept. 000.

SEND FOR OUR BULLETIN "ELECTRONIC HEATING AND SEALING WITH THE THERMATRON"

See us at Booth 518 at the Second National Plastic Exposition in Chicago, May 6-10.

Thermatron DIVISION

RADIO RECEPTOR CO., INC.

251 West 19th Street. New York 11, N. Y.

Since 1922 in Radio and Electronics


TO ATTAIN excellence in plastic molding, many steps--each an essential part of the whole process—must be followed through accurately and thoroughly.
Every step of the way—designing, mold making, molding, and finishing—calls for the highest skill and experience, plus the proper plant facilities for efficient production. Combined, these operations can result in quality molding... plastics that "measure up" in performance, appearance and cost.
MACK experience and proven methods, plus three completely equipped plants, offer plastic molding that qualifies. Your inquiries are solicited; address Mack Molding Company, Inc., 100 Main Street, Wayne, N. J.
Mack
MOLDED
EXCELLENCE
MACK PLANT AT WATERLOO, P. Q., CANADA
MACK PLANT AT ARLINGTON, VERMONT
MACK PLANT AT WAYNE, NEW JERSEY

They're hanging up sales records as well as the Monday wash—these colorful clothespins made of Monsanto Lustron. More important, they're proving: *it's easy to do business with Monsanto Lustron.*

For as long as anyone could remember, clothespins were made of wood. Then some far-sighted men took an idea to a molder, produced it in Monsanto Lustron and built a new industry that sold hundreds of millions of better clothespins last year. They capitalized on these six qualities which no other material combines so advantageously as Monsanto Lustron:

- Minimum of time required to start business . . . minimum equipment . . . minimum capital outlay.
- Low cost per pound combined with light weight, gives more items per dollar.
- Adaptable to fastest, most economical mass production methods.
- Finishing, buffing, machining, stamping, tumbling, etc., eliminated or minimized.
- Waste material salvageable at full value.
- Gleaming, salesmaking colors inherent in Monsanto Lustron.

Whether you use Monsanto Lustron for all or part of your product, these same qualities can help you write your own success story. Get complete information from your molder or direct from: MONSANTO CHEMICAL COMPANY, Plastics Division, Springfield 2, Massachusetts. In Canada, Monsanto (Canada) Limited, Montreal, Toronto, Vancouver.

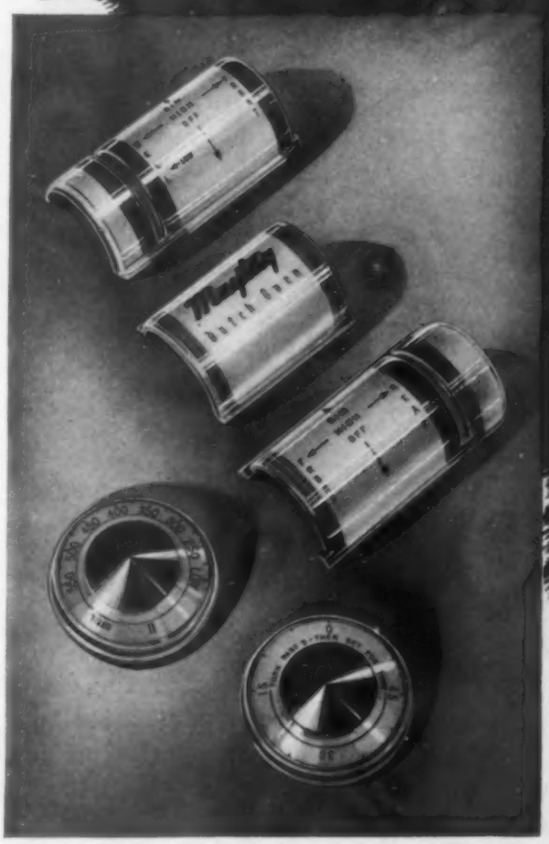
Lustron: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS for PLASTICS

Availability is another compelling reason for specifying Monsanto Lustron . . . over 80 million pounds is being produced this year.

SERVING INDUSTRY . . . WHICH SERVES MANKIND

ALL 5 OF THESE PLASTIC PARTS ARE AT *Home on the Range*



Above plastic fixtures as injection molded by Consolidated, were furnished to Globe American Corporation, Kokomo, Indiana, for use on Maytag Dutch Oven, product of The Maytag Company, Newton, Iowa.

FUNCTIONALLY AND DECORATIVELY THEY ENJOY A CENTRAL SETTING ON THE NEW

Maytag Dutch Oven

These handles and dials exemplify a quality of plastics production "Where seldom is heard a discouraging word".

When entrusted to their end use assignment, parts like those featured here are certain to make good . . . Why? . . . because —

The material formulation is right — The die construction is right — The processing is right!

And believe us, gentlemen, when we state that the custom molder must in every instance exactingly safeguard or establish the proper specifications . . . and then see them through to the customer's use-wise satisfaction! Otherwise, the product suffers — the use of it fails — and the industry loses face!

Like you, we too, read the daily press and when some slipped-in reference happens to be made of an inadvertent use of things plastics — we boil! This industry's climb to full public acceptance is based on sound custom molder relations — and not on the theory that because an application is of plastic, anything goes.

Since 1874, Consolidated has practiced custom molding. As of 1947, therefor, we have reached the position where we can advantageously determine the right material — the proper mold — and deliver the most desirable method of production. So, call in Consolidated!

Consolidated
MOLDED PRODUCTS *Corporation*
309 CHERRY STREET,
SCRANTON 2, PA.

"Your Blueprint in Plastic"

PRODUCT DEVELOPMENT • MOLD DESIGN • MOLD CONSTRUCTION • PLUNGER MOLDING • TRANSFER MOLDING • INJECTION MOLDING • COMPRESSION MOLDING

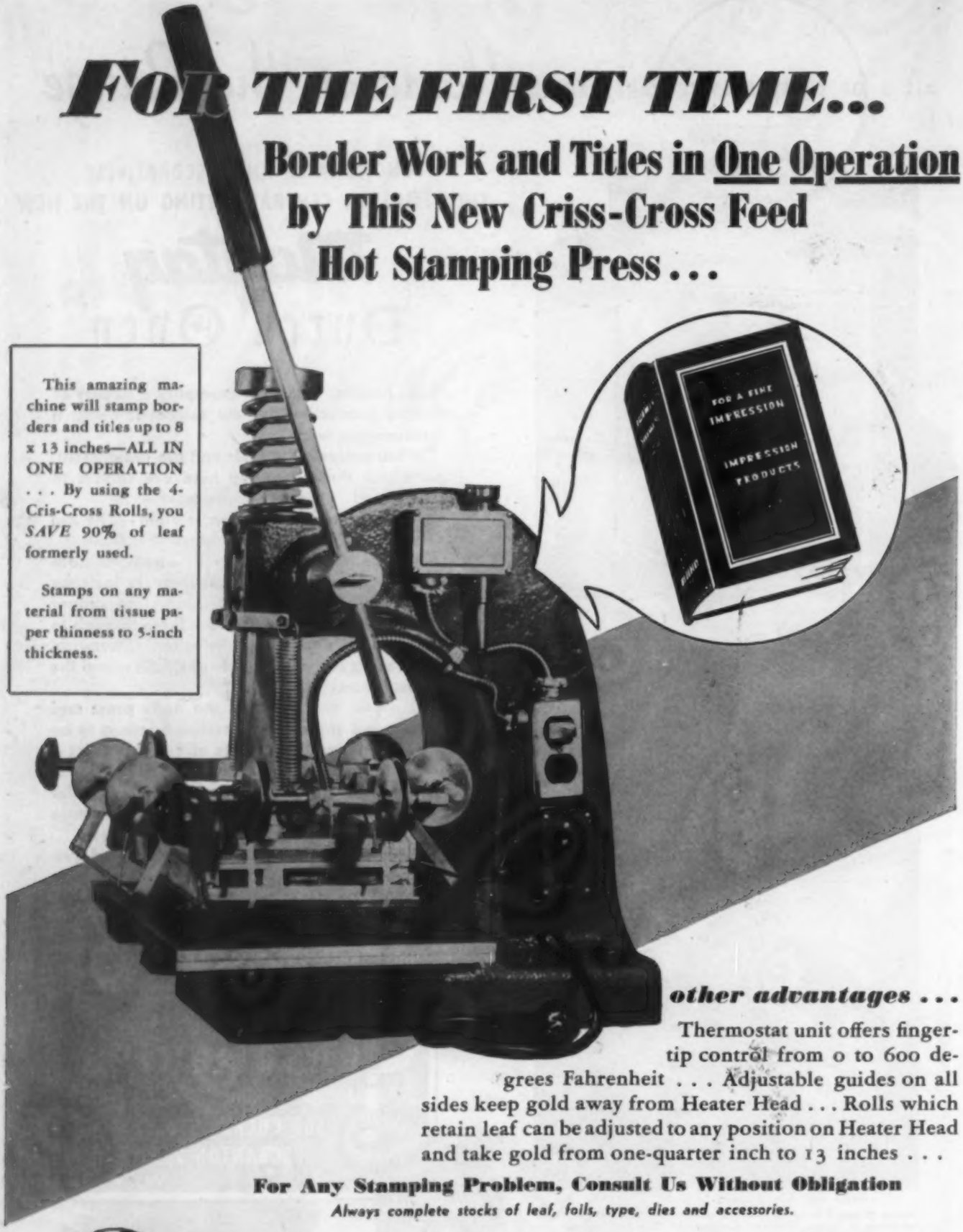
Branches: NEW YORK, *1790 Broadway* • CHICAGO, *549 W. Randolph St.* • DETROIT, *550 Maccabees Bldg.* • CLEVELAND, *4614 Prospect Av.* • BRIDGEPORT, *211 State Street*

FOR THE FIRST TIME...

Border Work and Titles in <u>One</u> <u>Operation</u> by This New Criss-Cross Feed Hot Stamping Press...

This amazing machine will stamp borders and titles up to 8 x 13 inches—ALL IN ONE OPERATION . . . By using the 4-Cris-Cross Rolls, you *SAVE* 90% of leaf formerly used.

Stamps on any material from tissue paper thinness to 5-inch thickness.



other advantages . . .

Thermostat unit offers fingertip control from 0 to 600 degrees Fahrenheit . . . Adjustable guides on all sides keep gold away from Heater Head . . . Rolls which retain leaf can be adjusted to any position on Heater Head and take gold from one-quarter inch to 13 inches . . .

For Any Stamping Problem, Consult Us Without Obligation

Always complete stocks of leaf, foils, type, dies and accessories.

Impression Products

A DIVISION OF **STAMP RITE** INC.

170 BROADWAY • N. Y. 7 • RE 2-0823-4-5

"That makes sense—

using Fiberglas-Reinforced Plastics"*

T-36 Fiberglas mat is *low in cost* and is used advantageously with *high-pressure laminating equipment* . . . This may be the answer to some of your problems. If you are designing, manufacturing or need products which require high impact strength, low moisture absorption, dimensional stability, high temperature resistance, corrosion resistance, good electrical qualities—find out about Fiberglas T-36 mat as a reinforcement for high-pressure resins . . . This product is also well adapted to new, high-speed, low-pressure molding processes.

WRITE FOR SAMPLE OF T-36 MAT AND NEW BOOKLET which describes the various forms of Fiberglas reinforcing materials and illustrates the new quantity production methods. Write: Owens-Corning Fiberglas Corporation, Dept. 876, Toledo 1, Ohio. Branches in principal cities.

In Canada: Fiberglas Canada Ltd., Toronto 1, Ontario.

OWENS-CORNING

FIBERGLAS

TM. REG. U.S. PAT. OFF.

FIBERS • MATS • CLOTHS

*FIBERGLAS is the trade name (Reg. U. S. Pat. Off.) of a variety of products made of or with glass fibers by Owens-Corning Fiberglas Corporation.

TWO JOBS • TWO PRESSES
One Preheater

Airtronics **PREHEATER, Model DH, 2.5 KW OUTPUT on the job at McDONALD MANUFACTURING COMPANY, Los Angeles**

On the production job illustrated, the Dual Load feature of AIRTRONICS Preheaters is demonstrated. The weight of one molding charge is nearly twice the weight of the other, yet both are preheated with equal efficiency *without control readjustments between heats.* Molding pressures and curing time are reduced about 50%.

AIRTRONICS Preheaters are *COMPACT, SIMPLE TO OPERATE, EASY TO ADJUST.* They are PROVEN, reliable and trouble-free performers. Why not consider their application to your molding operations. Telephone or write the nearest AIRTRONICS representative for complete details.

FROM ONE MOLDER TO OTHERS...

"We have used AIRTRONICS high frequency generators since their first model. During the intervening years we have followed the development of each new design and have made comparative tests with competitive equipment. It is a pleasure to report that we consider AIRTRONICS pre-eminent in their field and do not hesitate to recommend their equipment to other molders."

J. D. McDonald

SOCIETY OF THE PLASTICS INDUSTRY

Airtronics **MANUFACTURING COMPANY**

CHICAGO	NEW YORK	LOS ANGELES
2909 West Grand Ave.	31-28 Queens Blvd. Dept. N-5	4536 Cutter Street
Dept. C-5, Zone 51	Long Island City, Zone 1	Dept L-5, Zone 26

A WIDE RANGE OF *Plastic Products*

PRODUCED AT LOW COST on the

VAN DORN INJECTION PRESS

From A to Z! . . . an amazing variety of small plastic parts and products are rolling off Van Dorn Plastic Injection Presses. The Van Dorn is a *low cost* molder that turns out *low cost* multiple parts from *lower cost* molds.

This versatile one ounce press is built for simple, fast set-up and operation . . . and assures quantity production of quality products. Investigate its application for your requirements.

Write **FOR FREE FOLDER**

which illustrates and describes the Van Dorn Plastics Injection Press and its applications.

THE VAN DORN IRON WORKS CO.

2687 EAST 79TH STREET • CLEVELAND 4, OHIO

RESINS

for ABRASIVE PRODUCTS

Grinding Wheels: 1364, 2731, 1015-3025 Solid (Powdered) 8121, 3014 Liquid

Abrasive Discs: 1045, 2838 Liquid (Water Dilutable)

for INSULATING VARNISHES

Heat Reactive: 901, D145, 7424 Solid (Lump) D148-W641, 2126 Solid (Lump or Crushed)

Permanent Fusible: 836, 250 Solid (Lump)

for FRICTION MATERIALS

Brake Linings and Clutch Facings: 6334, 7627, 9111, 5477F, 5475 Solid (Powdered) 6106, 7200, 9815 Oil Modified Phenolic (Powdered) 985 Oil Soluble (Lump) 9639, 9685, Oil Modified (70% - 85% Solids) 1350 Plasticized Phenolic (Liquid) D169 Resin Solution

for PROTECTIVE COATINGS

Oil Soluble: 250, 836, 250F, 2217, 1820, D148 Pure Phenolic. 40-43 Modified Phenolic

Heat Curing: 5476, 2896A Resin or Solution (70%)

for COATING & IMPREGNATING

Laminating Varnishes: 3070, 2160, 1524 Resin Solution (60% Solids) 2686 Resin Solution (70% Solid)

Water Soluble Resins: 575, 2801, 3257 Liquid (70%-80% Solids) 1412 Liquid (70% Solids)

for BINDERS

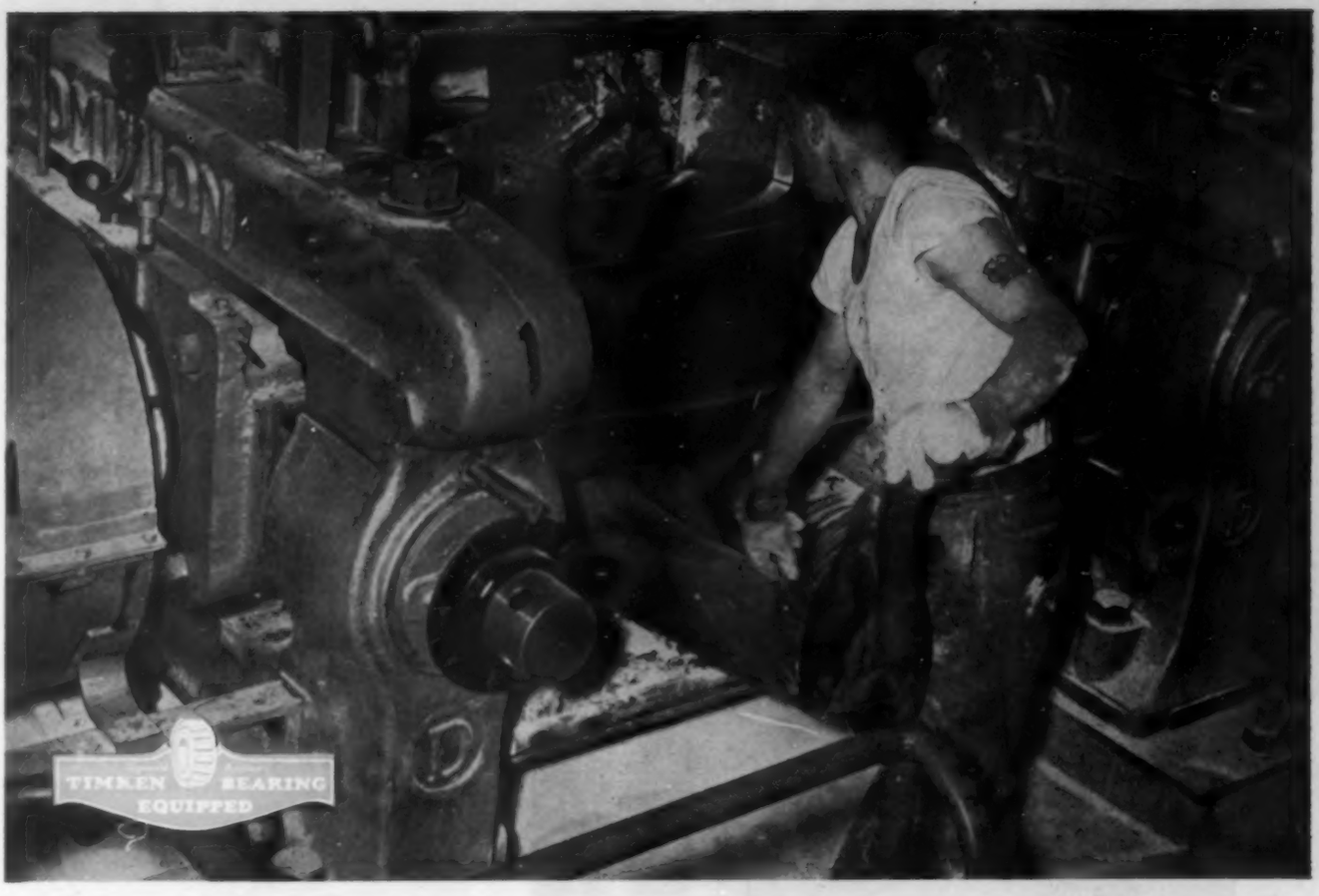
Cork Sheets: 1900, 2111, 2954 Plasticized Phenolic (Liquid 70-100% Solids)

Glass and Mineral Wool: 2801, 1292, 3330 Liquid (Water Dilutable)

Synthetic VARCUM Resins

VARCUM CHEMICAL Corporation

★ NIAGARA FALLS, N. Y. ★



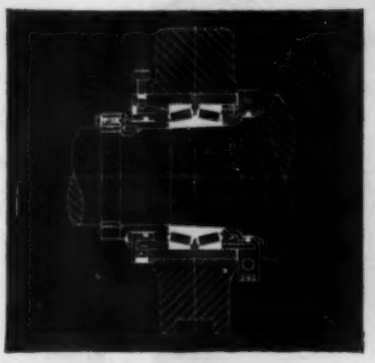
New Mills at Canadian Resins And Chemicals Limited Equipped with TIMKEN BEARINGS

The new "Vinylite" Plastic plant of Canadian Resins and Chemicals Limited, Shawinigan Falls, Quebec, affords a splendid example of the high technical and mechanical standards that have been attained in the production of plastics materials.

Timken Balanced Proportion Tapered Roller Bearings are applied on the roll necks of the Dominion compounding mills, providing increased roll neck strength and rigidity; minimum roll deflection; and maximum radial, thrust and combined load capacity. The rigidity of the mounting permits the incorporation of effective bearing housing seals, insuring positive lubrication and absolute cleanliness at all times — no oil leaks to spoil the material being milled. Timken Bearings also are used on the main drives of the mills.

Another and equally important advantage resulting from the use of Timken Bearings is greatly reduced mill maintenance — a point every plastics producer will appreciate.

Subsequent production processes are performed on Timken Bearing Equipped calenders and extruders. These machines will be featured in forthcoming advertisements. All equipment was designed and built by Dominion Engineering Works Limited, Montreal, Canada. The Timken Roller Bearing Company, Canton 6, Ohio.



Timken Bearing Application as used on the mill roll necks.

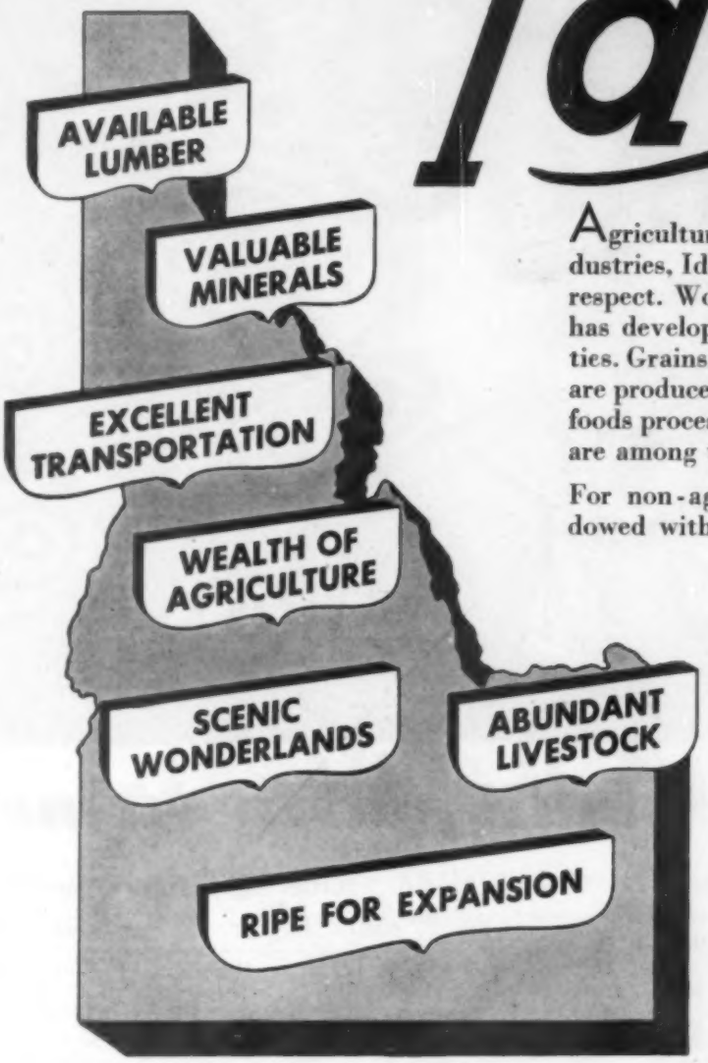
TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL AND THRUST —○— LOADS OR ANY COMBINATION

UNION PACIFIC

TREASURE MAP OF INDUSTRY

Idaho*

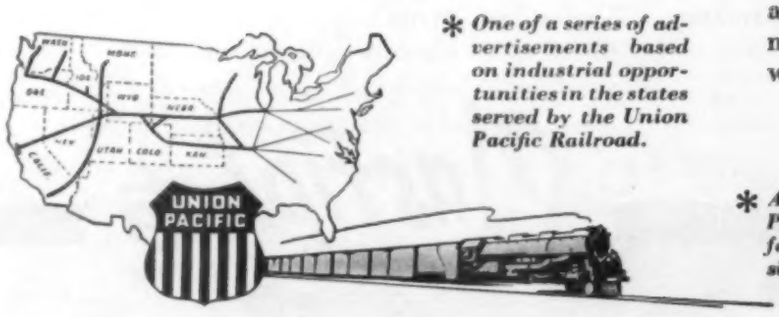


Agriculture being the life-blood of many industries, Idaho is particularly fortunate in that respect. World-famous for the Idaho potato, it has developed many other agricultural activities. Grains, vegetables, fruit... cattle and sheep are produced in abundance. Dehydration, frozen foods processing, dairying, canning and packing are among the state's flourishing industries.

For non-agricultural industries, Idaho is endowed with rich veins of minerals. Numerous manufacturers of stone, clay and glass products have established plants in Idaho. Lumber for building and wood products is available. Unsurpassed rail transportation is provided by Union Pacific.

As a vacation region, Idaho has a wonder-world of its own in Sun Valley . . . year-'round sports center... the world famous primitive area . . . and in the scenic surroundings of Payette Lake.

Idaho is a young thriving state, ripe for further industrial development. It offers good living and working conditions, good schools, splendid cultural advantages... and its energetic citizens assure newcomers of a true western welcome.



* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE

Plastiplate your small plastic items!

Plastiplate's exclusive plating processes and mass production techniques turn out thousands upon thousands of small gold and silver plated pieces . . . at surprisingly low cost. The beauty and brilliance of *Plastiplate's* plated items are outstanding; the durability of the finish assured by rigid laboratory control.

Plastic buttons, bottle caps, jewelry, novelties, handles, knobs, combs, charms, etc., are just a few of the vast variety of items that can be *Plastiplated* to meet your every budget and quality requirement.

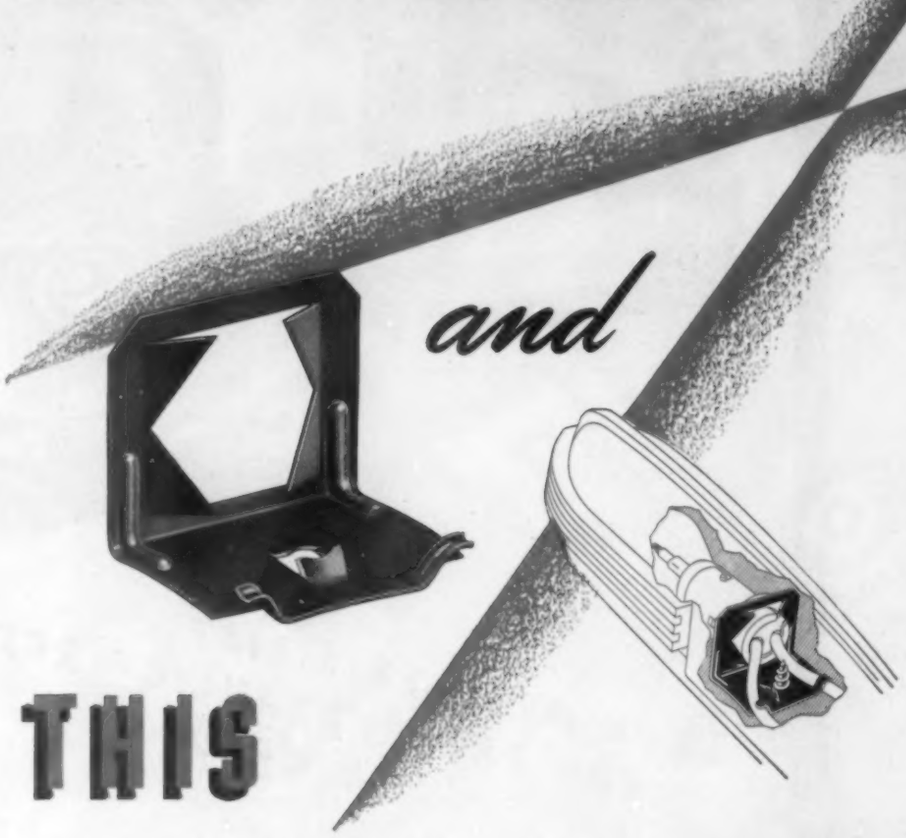
If your problem is fine plating at low cost, let *Plastiplate's* experienced personnel show you how it can be done. Write today!

MASS PRODUCTION AT LOW COST

Plastiplate CO., INC.

SOUTH RIVER • NEW JERSEY

This is a SPEED NUT*



and

THIS

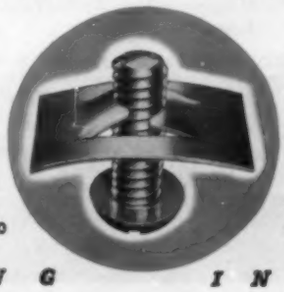
..is also a Speed Nut!

Take a look at this one SPEED NUT that does *three* jobs. Conceived by our development engineers to simplify automotive parking lamp assembly, it retains light socket, spaces wires and fastens entire assembly to the base. (See sketch). It replaced four separate parts and eliminated three machining and welding operations.

This is but a typical example of the SPEED NUT Savings Factor. So flexible is the basic SPEED NUT principle, it can be incorporated in almost any conceivable shape to improve your product, speed up your assembly, reduce the number of parts and cut costs. We can give you a no-charge fastening analysis that may surprise you. Send in your assembly details today.

TINNERMAN PRODUCTS, INC.,
2048 FULTON ROAD • CLEVELAND, OHIO

In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In England: Simmonds Aerocessories, Ltd., London
In France: Aerocessoires Simmonds, S. A., Paris
In Australia: Aerocessories, Pty. Ltd., Melbourne



Speed Nuts*
PATENTED
MORE THAN 4000 SHAPES AND SIZES

* Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS

Saran BY NATIONAL RATTAN

THE MATERIAL THAT KEEPS PACE WITH AMERICA'S BETTER AUTOMOBILES

In today's better automobiles, as well as in public transportation equipment, the aim is for beauty, comfort and satisfactory performance. Extruded by National as a rattan, SARAN has been woven into upholstery material that meets these demands with flying colors. Notable among its many properties, is its extraordinary resistance to wear. Its flexibility and natural smoothness assure maximum riding comfort . . . you slide into a Saran-upholstered seat without tugging on clothes. SARAN defies dirt! Grease, mud or any other foreign matter can be wiped away with ease. Unlimited color possibilities permit weaving SARAN rattan into multi-colored patterns, in complete harmony with any decorative scheme. Look into the advantages of SARAN when you consider any upholstery problem.

SARAN BY NATIONAL denotes monofilament, rattan and tape manufactured by The National Plastic Products Company from Saran, a vinylidene chloride copolymer made by The Dow Chemical Company and supplied to mills, weavers and other fabricators for specific end uses.

TRADE MARK REG. U.S. PAT. OFF.

The NATIONAL Plastic Products Company

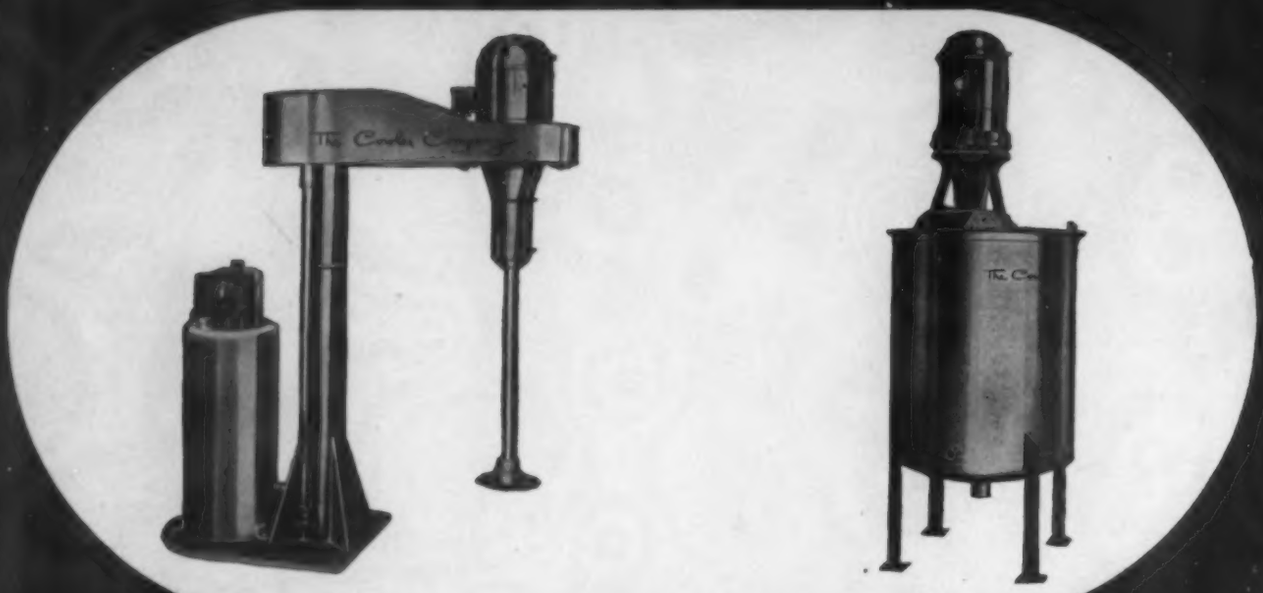
ODENTON • MARYLAND

NEW YORK: EMPIRE STATE BUILDING • LOS ANGELES: BANKERS BUILDING

New MOLECULAR Scrubbing Action

DISSOLVES DISPERSES

From 25 MINUTES to 10½ HOURS *Faster*



COWLES DISSOLVER

A high-speed machine that develops high-velocity interface shear

Turning at a rate of speed that dissolves or disperses from two to twenty times faster than the conventional mixer, the impeller of the Cowles Dissolver is scientifically designed to set up components of laminar flow. Each lamina, moving at a different rate of speed from its neighbors, creates interface shear between surfaces of molecular thickness. The multiple surfaces and high velocity gradients of these laminae subject every particle of the materials being treated to molecular tension and scrubbing, greatly accelerating the dissolving or dispersing action. Undissolved residues are held to low levels and more homogeneous mixtures are produced. Splash and dead spots are eliminated. Turbulence and aeration are held at low levels, though controlled aeration can be had if desired.

Safe, Silent, Long-Wearing

Sound design and rugged structure . . . plus finely machined materials of high physical properties . . . all assure maximum life with minimum maintenance requirements. A high degree of static and dynamic balance has been achieved in the rotating parts, eliminating noise, vibration.

Models With or Without Tanks

In two models—with built-in tanks in capacities of 100 gallons, 250 gallons and 500 gallons, or for use in tanks brought to the machine. Motor speed and horsepower adjusted to the need. Explosion-proof motors on special order. Write for descriptive folder, or ask for a technical representative to call.

5 Years of Commercial Test Show Cowles Dissolver Up to 10½ Hours Faster on Typical Operations

Type Operation	*Material*	*Cowles Dissolver*	*Standard Mixer*
Gum Cutting	Rosin	1½ Hrs.	12 Hrs.
Synthetic resin dissolving	Vinylite	1 Hr.	6 Hrs.
N/C solution	Nitrocellulose	12 Min.	90 Min.
Tinting	Enamel	5 Min.	30 Min.
Pigment dispersion	Heavy enamel	6 Min.	150 Min.
Coating suspension	H. T. Clay	1 Hr.	9 Hrs.

The Cowles Company
INCORPORATED

Cayuga, N. Y. *Associate: Alexander Fleck, Ltd., Ottawa, Ont.*

Molding a Man's Taste in Cars

Steer-o-toy, Molded for Steer-o-toys, Inc., Chicago

There is a special pleasure in molding playthings like this Steer-o-toy. But there is a special challenge as well. Molding a realistic toy lays it open to the keenest critic in the world—the American boy. If anybody is a hawk-eye for detail, it is the youngster who starts developing his automobile "know how" at the plaything stage.

For proof, ask any motorist or automobile dealer who has a small son or younger brother.

Our molding ability has passed this type of critical test often, for we are frequently commissioned to produce toys of varying shapes and sizes. Many of these toys are of the realistic type.

Through the use of the proper design, mold, and plastic material, they are planned for sturdiness as well as style. So, if you are out to make "pay things" of your playthings, you will be wise to investigate our injection molding and extrusion services today.

Write on your letterhead for the new Injection Molded and Extruded Plastics catalogue. Or, for detailed information about MILLS-PLASTIC* pipe, tubing and fittings, write for circulars containing data and illustrations.

*Trademark Reg.

ELMER E. MILLS CORPORATION

Molders of Tenite, Lumarith, Plastacele, Fibestos, Lucite, Plexiglas, Nylon, Polystyrene, Styron, Lustron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Cerex, Forticel, MILLS-PLASTIC*, Saran, and other Thermoplastic Materials

153 WEST HURON STREET • CHICAGO 10, ILLINOIS

The plastic products and parts shown here are molded by Plastic Manufacturers. Each application is designed to secure the fullest value from plastics.

Upper view—Hand microphone housing, molded for the Gray Manufacturing Co.

Lower view—Penicillin syringe and cap, molded for Becton, Dickinson & Co.

• We work closely with engineering departments of plastics users, and have developed new molding techniques and many unusual plastic applications. Our facilities include transfer and compression presses of the latest type, in capacities up to 500 tons. Injection presses from 2 oz. to 16 oz. We have complete finishing and assembly equipment and are prepared to execute your molded plastics requirements from research and design development to molding and finished assembly. • Write for Catalog Folder MP5.

PM
REG. U.S. PAT. OFF.

PLASTIC MANUFACTURERS

INCORPORATED

STAMFORD, CONNECTICUT

INJECTION, TRANSFER & COMPRESSION MOLDING • COMPLETE ASSEMBLY

Representatives: NEW YORK CITY—19 West 34th Street • DETROIT, MICH.—805 New Center Building
CAMBRIDGE, OHIO—633 Upland Road • LOS ANGELES, CAL.—1440 S. Robertson Blvd.
CANADA—David C. Orrock & Co., 1405 Bishop St., Montreal

INDUSTRIAL SYNTHETICS

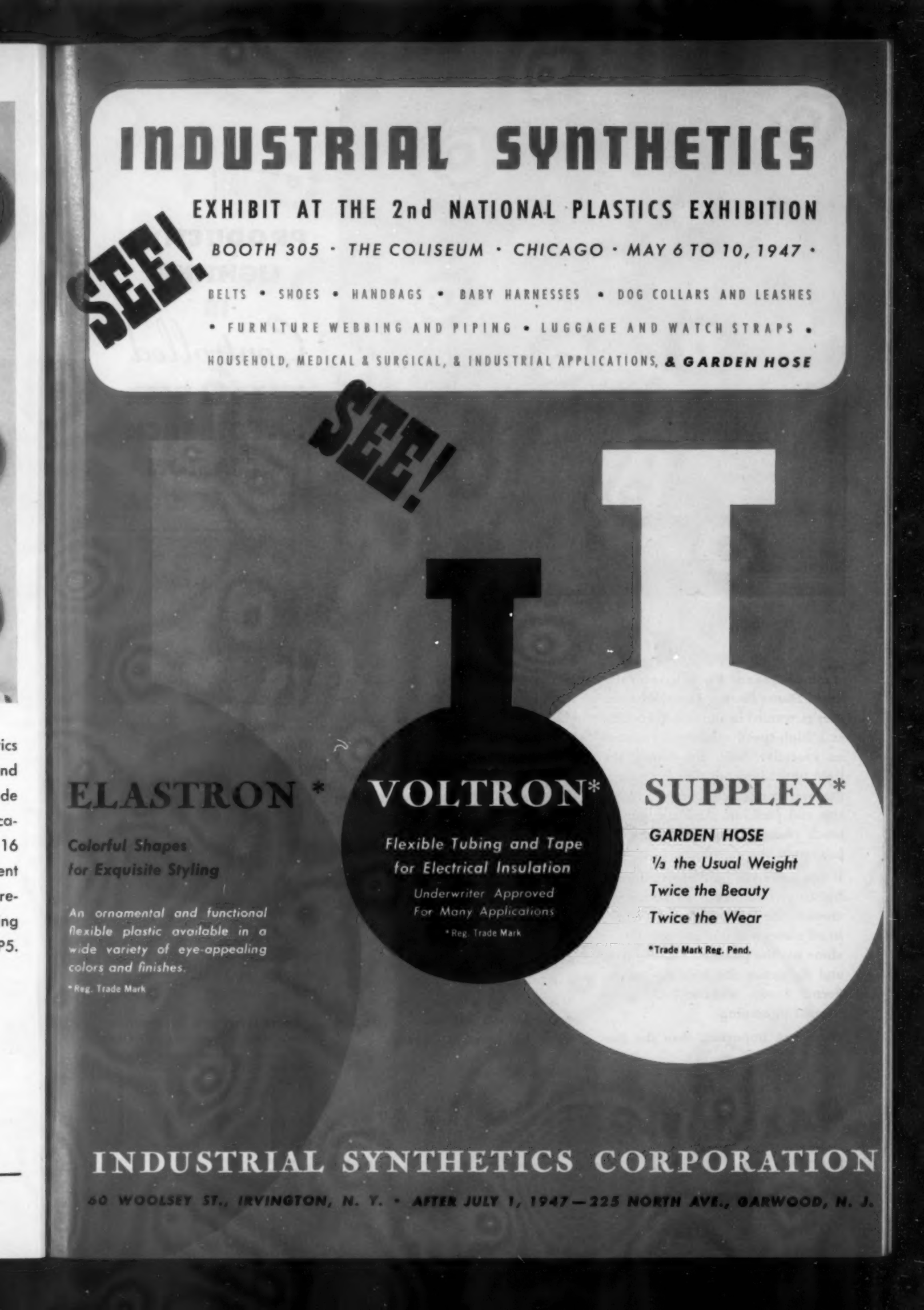
EXHIBIT AT THE 2nd NATIONAL PLASTICS EXHIBITION

BOOTH 305 · THE COLISEUM · CHICAGO · MAY 6 TO 10, 1947 ·

SEE!

BELTS • SHOES • HANDBAGS • BABY HARNESSES • DOG COLLARS AND LEASHES • FURNITURE WEBBING AND PIPING • LUGGAGE AND WATCH STRAPS • HOUSEHOLD, MEDICAL & SURGICAL, & INDUSTRIAL APPLICATIONS, **& GARDEN HOSE**

SEE!



ELASTRON *

Colorful Shapes for Exquisite Styling

An ornamental and functional flexible plastic available in a wide variety of eye-appealing colors and finishes.

*Reg. Trade Mark

VOLTRON*

Flexible Tubing and Tape for Electrical Insulation

Underwriter Approved For Many Applications

*Reg. Trade Mark

SUPPLEX*

GARDEN HOSE

⅓ the Usual Weight

Twice the Beauty

Twice the Wear

*Trade Mark Reg. Pend.

INDUSTRIAL SYNTHETICS CORPORATION

60 WOOLSEY ST., IRVINGTON, N. Y. · AFTER JULY 1, 1947—225 NORTH AVE., GARWOOD, N. J.

PRODUCTIVE LIGHTING IS *Controlled* BY EACH USER ...FOR EACH OCCASION

Trained eyes and hands have an ally in the Dazor *Floating* Lamp, whether they're teamed in the first-aid room, at a high-speed machine or across an executive desk. By *floating* the light to the best position for seeing, the user completely controls intensity and position. And a finger-tip touch *changes* either, each time the job requirements change.

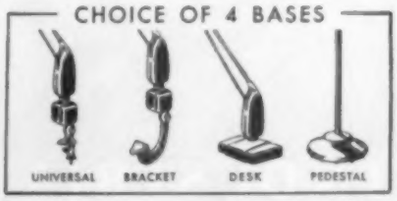
If you are accustomed to stationary lighting, or a lamp of restricted motion, the free movement of light in *all planes* will intrigue you. Dazor alone has the patented *Floating* Arm and its device for holding the reflector firmly, without locking or manual tightening.

But more important than the *how* is the *why* of Dazor illumination. Employees who enjoy this comfortable, glareless lighting see fine details more clearly on machining, assembly, inspection, drafting and other exacting operations. As errors and hazards decline, there is a rise in morale. Special skills come to the front and productivity shows a gain.

Phone Your Dazor Distributor for typical applications by other users or an on-the-spot demonstration. For the name of this nearby lighting authority, if unknown to you, write to Dazor Manufacturing Corp., 4481-87 Duncan Ave., St. Louis 10, Mo. *In Canada* address inquiries to Amalgamated Electric Corporation Limited, Toronto 6, Ontario.

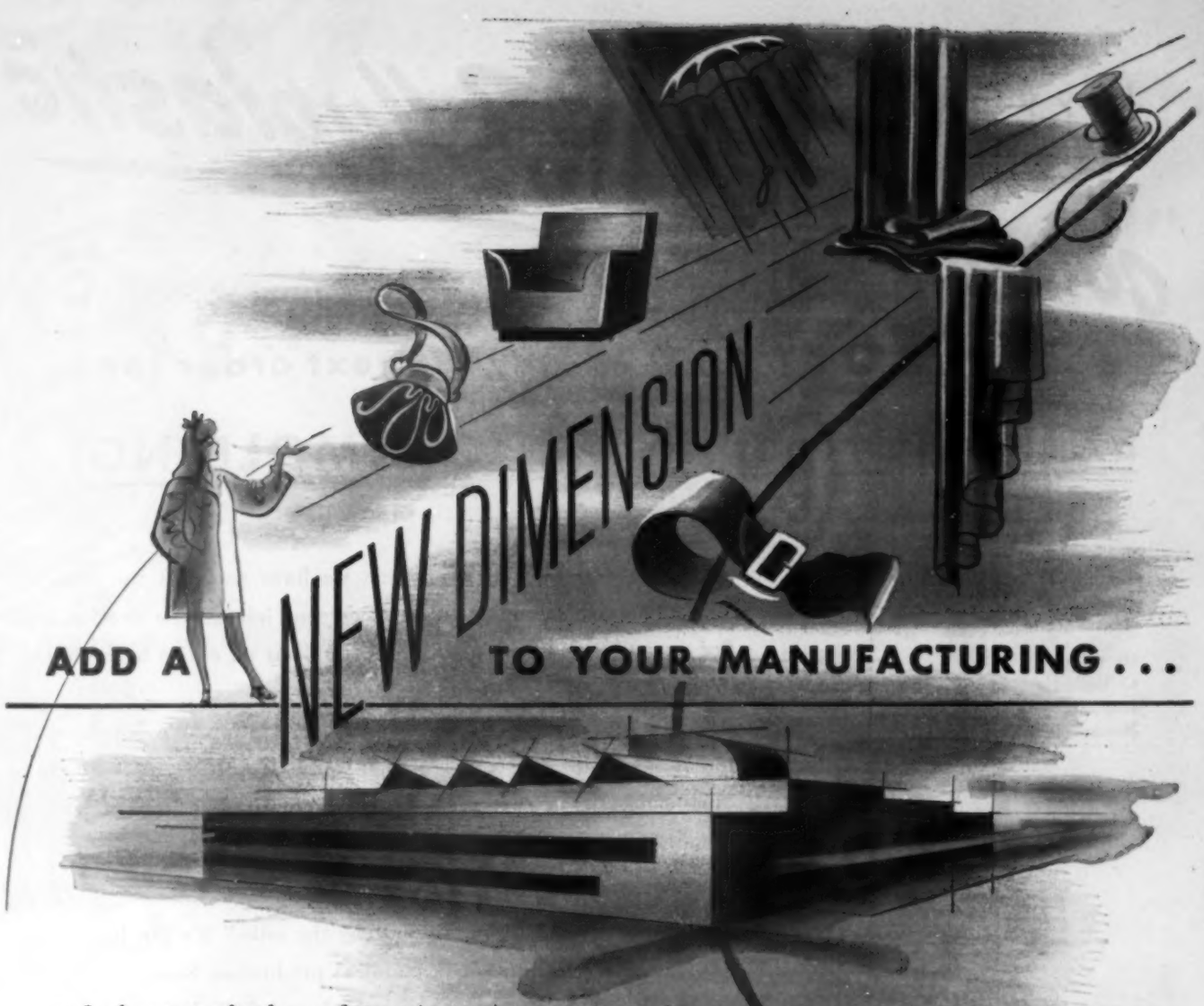
MOVES FREELY INTO ANY POSITION AND STAYS PUT — *WITHOUT LOCKING*

CHOICE OF 4 BASES



DAZOR FLOATING LAMPS

FLUORESCENT and INCANDESCENT



ADD A NEW DIMENSION TO YOUR MANUFACTURING . . .

● In the greater freedom and scope it can give to your manufacturing plans, RESPROID is like a new dimension.

This modern wonder plastic comes in unsupported films, plastic coated fabrics and extruded shapes to make a range of products as limitless as your own imagination—shower curtains, handbags, upholstery, luggage, food covers, draperies and many others.

RESPROID is made in an almost infinite variety of styles . . . from transparent to opaque . . . from paper-thin calendered films, printed or plain, to heavy films embossed with leather grains. It is available in a rainbow of jewel-like colors and pastel shades. Manufactured by Respro Inc. under careful laboratory control in its fully equipped plant, RESPROID is waterproof, acid and alkaline-resistant, insoluble in most greases and oils. It is unusually easy to handle.

Whether you're looking for new products to make, or new ways to improve your present lines, you should investigate RESPROID's possibilities!

Be sure to see the RESPROID *exhibit in Booth 37 at the second National Plastic Exposition in Chicago May 6-10.*

Genuine Resproid Plastic

Respro INC.
CRANSTON 10, RHODE ISLAND

A Superior Vinyl Film....

. . . FLEXTON . . . as fine a product as modern science and painstaking care can make. . . . Plastic fabrics and plastic leathers styled in the best fashions of the day.

You are cordially invited . . . .

to visit our exhibit (Booth No. 4) at the National Plastics Exhibition, The Coliseum, Chicago, May 6-10, 1947. There you will see the perfect plastic film combination — PHOTOTONE prints on FLEXTON vinyl, featuring 48 and 54 inch wide material for the drapery and tablecover trade.

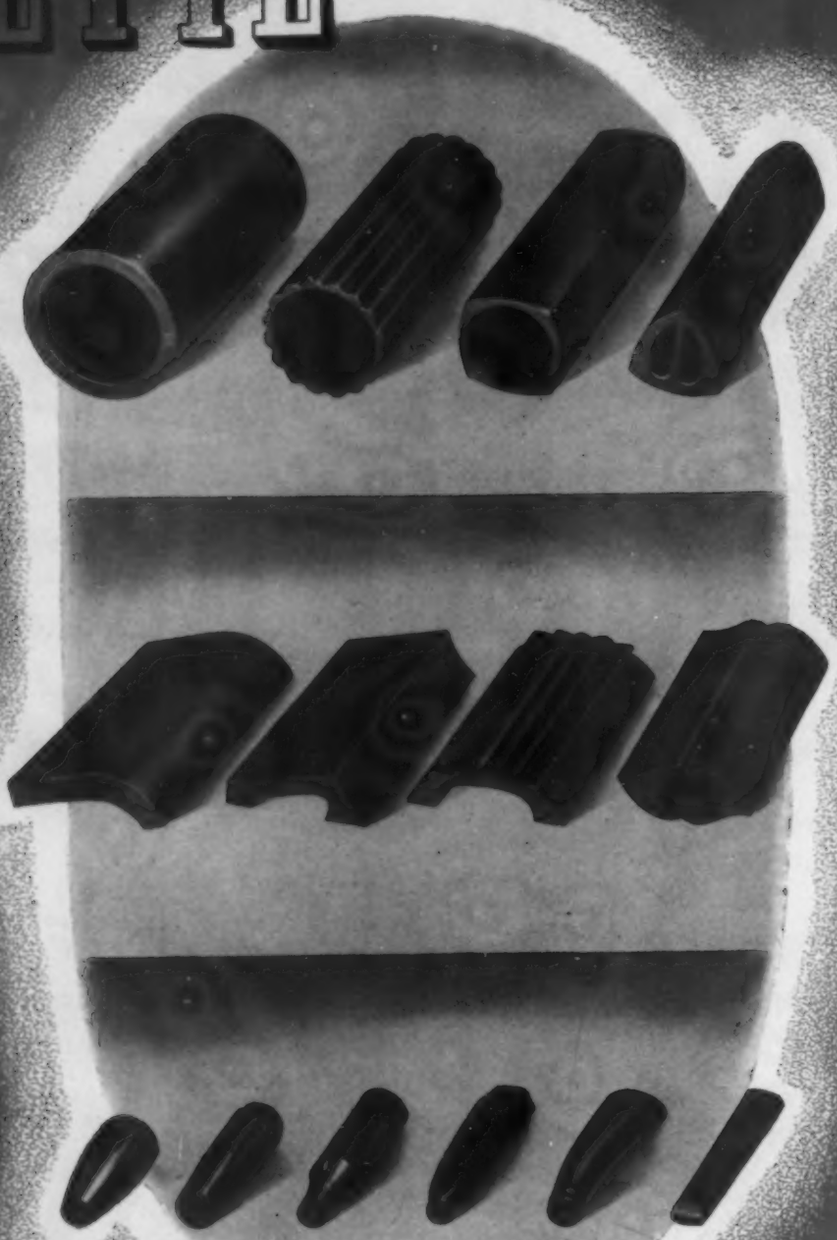
CREATIVE *Fabrics,* INC.

Pioneers and Creators in Plastics
23 West 23rd Street,
New York 10, N. Y.

FLEXTON
TRADE MARK

A CAST PHENOLIC RESIN OF EXCEPTIONAL QUALITIES

MARBLETTE



Outstanding among plastics, Marblette has a jewel-like depth and a complete color range which duplicates the appearance of precious stones, tortoise shell and ivory.

Its almost infinite variety of colors is available in transparent, translucent, opaque, or in mottled effects. Marblette also comes in a water clear form known as "Crystle" in a wide choice of colors.

Marblette's machining characteristics, resistance to oils and acids, non-inflammability and exciting beauty make it ideal for countless manufacturing needs.

MARBLETTE will help plan your world of tomorrow. The Marblette staff of engineers offers its services to help with your manufacturing problems. Write to us outlining your needs.

SPECIAL CASTINGS

Marblette is supplied in sheets, rods, tubes, and special castings such as cutlery handles, kitchen utensil handles, pipe stems, cigarette holders, clock cases, automotive trimmings, jewelry items, buckles, etc. Special shapes made to customer's specifications can be supplied provided draft is all one way.

THE MARBLETTE CORPORATION

Manufacturers of Phenolic Resins since 1929

37-21 THIRTIETH ST., LONG ISLAND CITY 1, N. Y.

"Phillips Screws best suited to new assembly techniques" . . .

says

GLOBE AMERICAN CORP.

Highlights of an interesting report by the independent investigator of the James O. Peck Co. . . . another in their series of studies of assembly savings made with Phillips Recessed Head Screws.

"We are 100% sold on Phillips Screws," the Works Manager of Globe American said, "because they fit right into our plans for the most efficient production methods in manufacturing our Dutch Oven Gas Ranges.

"Easier To Power-Drive. The Phillips Recessed Head is perfect for the air tools we're using in our assembly. They're practically *geared* to the tool so they start faster and drive easier.

"Simplify Awkward Applications. In the sub-assemblies and the final assembly many of the Phillips Screws used in each stove have to be driven from an angle . . . putting on door handles, driving under a ridge and some 'blind' driving. Most of these applications would be difficult or impossible with slotted screws, but are simple with Phillips Screws because of the snug fit of driver bit in the recess. Even when the driver is at an angle, they can be set up tight.

"No Gouging of Enamel. A lot of these screws are used close to the enamel finish of the stove. A regular slotted head driver would jump out of the screw head and scratch the work often enough to make the cost of consequent disassembly, refinishing and reassembly a serious factor. This can't happen with Phillips Screws."

One of the many sub-assemblies of the Dutch Oven Ranges which illustrates the hazards to enamel finishes if slotted screws were used.

Straight-on or angled, the Phillips Recessed Head permits a fast start and a safe finish.

You'll Find Good Ideas for your assembly in this and other reports of assembly studies . . . covering metal, wood and plastic products. Use coupon.

PHILLIPS *Recessed Head* SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

23 SOURCES

American Screw Co.
Central Screw Co.
Continental Screw Co.
Corbin Screw Div. of American Hdwe. Corp.
The H. M. Harper Co.
International Screw Co.
Lamson & Sessions Co.
Milford Rivet and Machine Co.
National Lock Co.
National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.
Pheoll Manufacturing Co.
Reading Screw Co.
Russell Burdsall & Ward Bolt & Nut Co.
Scovill Manufacturing Co.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Stronghold Screw Products, Inc.
Wolverine Bolt Company

Phillips Screw Mfrs., c/o Horton-Noyes
800 Industrial Trust Bldg.,
Providence, R. I.

Send me reports on Assembly Savings with Phillips Screws.

Name .....

Company .....

Address .....

IT'S NOT FABRICATED

While it may look like a fabricating job, this battery display case is actually made in one piece.

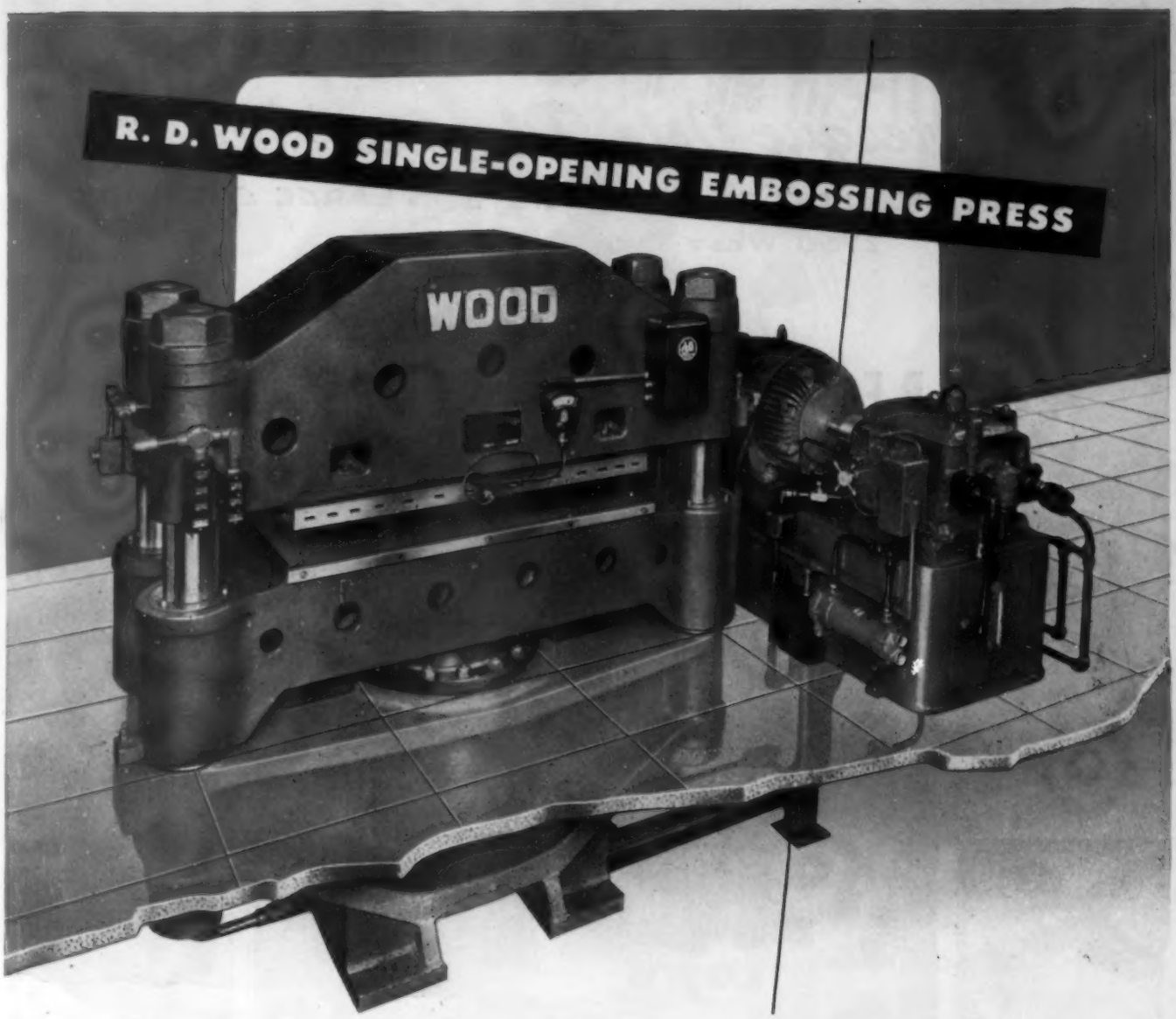
It's really a smooth job of injection molding and a fine sample of the kind of custom work we do. Molded of transparent polystyrene on an 8 oz. Reed-Prentice machine, this display case weighs 9½ oz. If you examine it carefully, you'll see that there is no shrinkage nor are there any stress marks to mar its design. At one time, an item like this was fabricated. But why fabricate it when you can mold it in one piece?

We also molded the flash light cases shown here. They too, are injection molded with metal inserts. They are molded of ethyl cellulose and in any color you may select. The same technique that turns out precision moldings like these is at your service. Our equipment is the best — 15 Reed-Prentice injection machines, our own able engineering staff — and last but not least, our more than 20 years' experience in plastics. All this together will pay off in whatever custom job you may be planning.

A. J. DESIMONE *Corporation*

MOLDERS of PLASTICS

180 PUTNAM ST. • PATERSON 4, N. J



For EMBOSSING LEATHER and SIMULATED LEATHER

This fully-automatic, single-opening, 500-ton embossing press utilizes a synchronized feeding mechanism to move the sheet material through the press. It operates at a maximum speed of twelve cycles per minute, and can be arranged for semi-automatic operation for the embossing of skins.

The electrically heated top platen is made from special process firebox steel plate with 14 strip heaters, and is furnished with a smooth tool finish on the top and bottom surfaces. Presses are manufactured for any platen size or capacity necessary to meet requirements.

Hydraulic power is supplied by a motor driven radial piston pump with a centralized control system which provides for either automatic or manual operation. An emergency stop button is provided to immediately halt the cycle and return the platen to full open position.

For more detailed information about this press or for engineering advice, write R. D. WOOD COMPANY, Independence Square, Philadelphia 5, Pa.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALLEVIATORS • INTENSIFIERS

R.D. Wood Company
EST. 1803

WANTED: Important roles for the KYS-ITE "EXTRAS"

they could play a leading part in this man's planning...

When a designer needs a friend—when ordinary materials just won't fill all the specifications—that's when the KYS-ITE EXTRAS are friends indeed.

For no other type of material can offer the EXTRA-ordinary combination of advantages that makes versatile KYS-ITE the solution to so many designing problems.

GREAT STRENGTH WITH LIGHT WEIGHT—Preformed before curing; impact strength up to 5 times that of ordinary plastics.

UNUSUAL BEAUTY—Lustrous colors are part of the material itself. Permanent beauty—a wipe and it's bright!

KYS-ITE CAN "TAKE IT"—Unusually durable and resistant to abrasion, impervious to mild alkali and acid solutions.

ADAPTABILITY—Lends itself to large hollow pieces, complicated pieces with projections or depressions, large or small shapes with flat surfaces or thin wall sections.

NON-CONDUCTOR—KYS-ITE's dielectric properties are important where safety is a factor. Poor conductor of heat and cold. Non-resonant, non-reverberating.

Worried about a molding problem? Why not let KEYES do your worrying for you? We custom mold to specifications, deliver units of guaranteed quality. Write us for complete details.

KEYES FIBRE COMPANY
420 Lexington Avenue
New York 17, New York
Plant at Waterville, Maine

KEYES
MOLDED PRODUCTS

Once Again PLEXON THE PLASTIC COATED YARN

Caps the Climax in a Brand new field

This NEW *Plexon Nurse's Cap stays white and crisp, cleans easily.*

Performing miracles isn't new for PLEXON. In field after field, this versatile plastic coated yarn has led the way to revolutionary improvements and brand-new uses.

Take the conservative realm of hospital wear, now nurses' caps are being made of Plexon, because of these obvious advantages:

PLEXON ***stays*** **white-bright and crisply attractive, even after days of wear.**

PLEXON cleans so easily—just a quick whisk with a damp cloth does the trick. No wonder both hospitals and nurses using caps made of PLEXON give it top rating.

This is only one case history showing how PLEXON can remedy product problems.

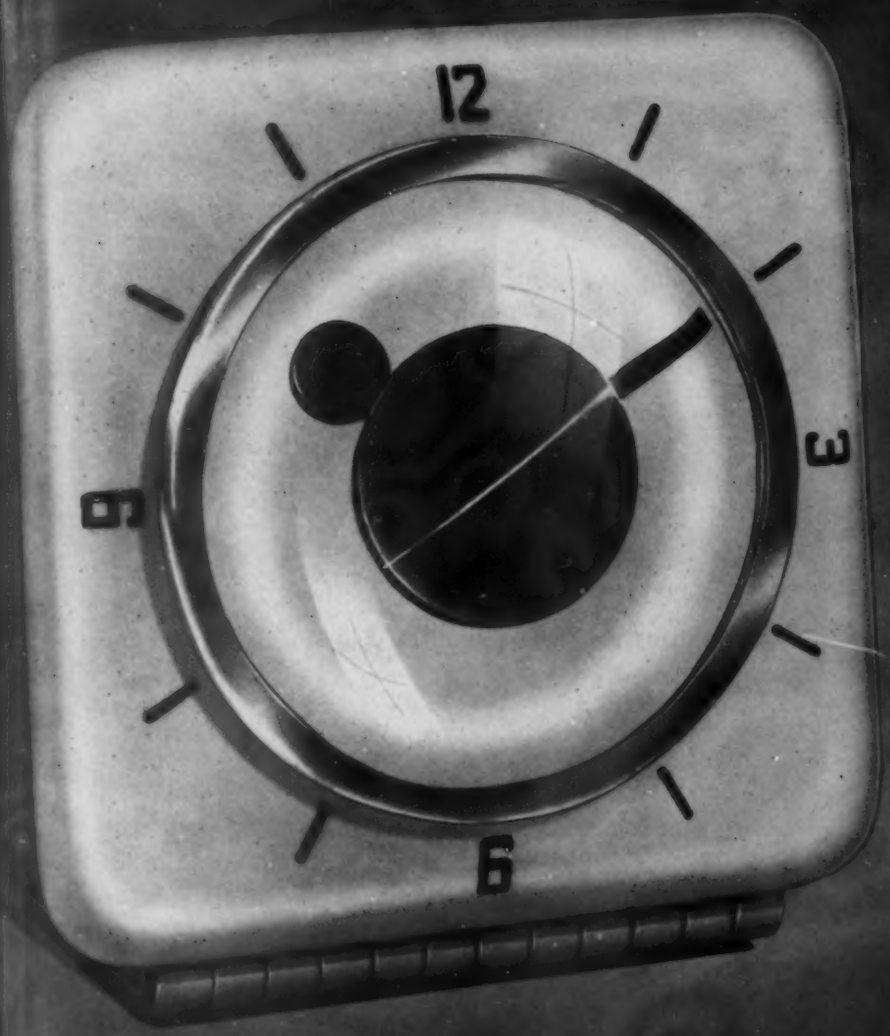
For complete information about PLEXON, and possible ways for using it in your business, write today to...

PLEXON, INC.

Offices: 212 Fifth Avenue · New York City 10, N. Y.

Whatever you do...

DON'T OVERLOOK CASTINGS!



This striking Me[illegible] clock owes much of its [illegible] and successful sales [illegible] to its brilliant cast resin [illegible] carried out by Creative in large volume. It is concrete proof that it is wise to look beyond ordinary molding and fabricating methods.

CASTINGS BY *Creative*
offer you these advantages:

INEXPENSIVE MOLDS • INTRICATE PARTS • UNSURPASSED FINISH • RICH COLORS • HEAVY SECTIONS

PLASTICS SPECIFICATION QUIZ

Are you looking for a case, panel, or just a knob? Send for the famous Creative Quiz. In two minutes you can tell us what we need to know about your product to permit our engineers to decide what plastic and what method you may require —if any.

Creative

PLASTICS CORP.

967 KENT AVE., BROOKLYN 5, NEW YORK

They're all made easier with *Mottletone*

From the beginning of your idea to the finished product—Mottletone facilitates your every step toward profit. It's the all purpose plastic—durable, colorful, adaptable to an endless variety of products.

Mottletone is an acrylic that is *mottled through and through.* In addition, it possesses the color characteristics of cast phenolics, machines easily, has marbleized appearance, and retains its glistening, lustrous polish.

Whether you are already manufacturing a product or contemplating a new one, the use of Mottletone means greater sales for you in these ways: 1—Its striking colors attract customers. 2—Its rich onyx-like finish has the expensive appearance that sells. 3—Its durability provides the satisfying wearing quality that puts your product in demand again and again.

For further information on Mottletone write to

PLASTI-CHROME INC.

Plasti - chrome, inc.

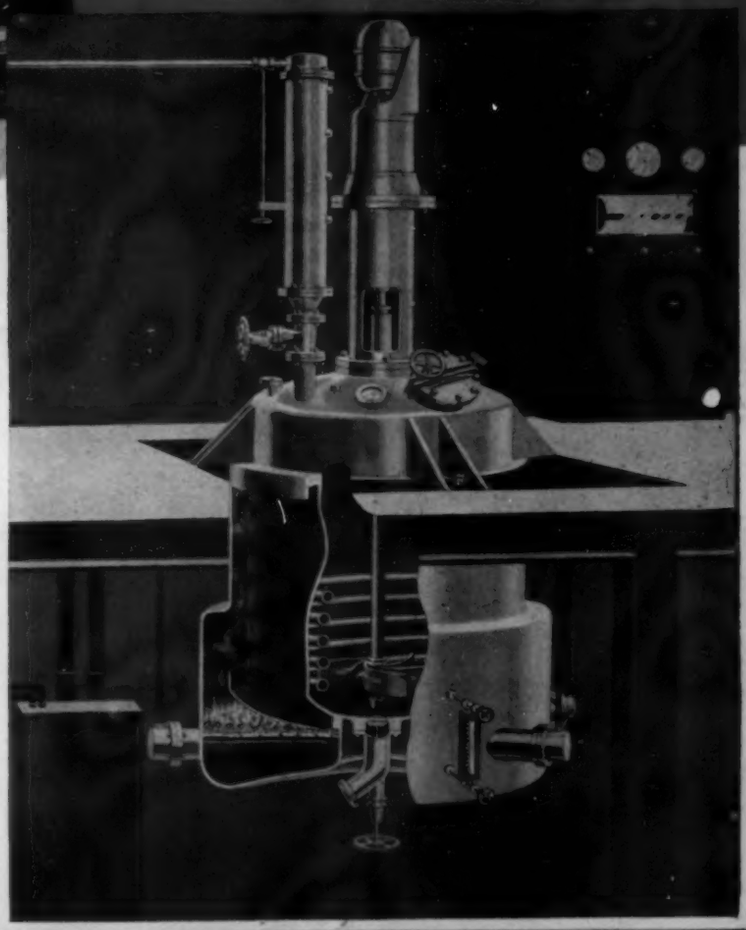
85 FIFTH AVENUE PATERSON 4, NEW JERSEY

CONTROLLED HEAT *without flame!*

BLAW-KNOX

ELECTRO-VAPOR

HEATING SYSTEM

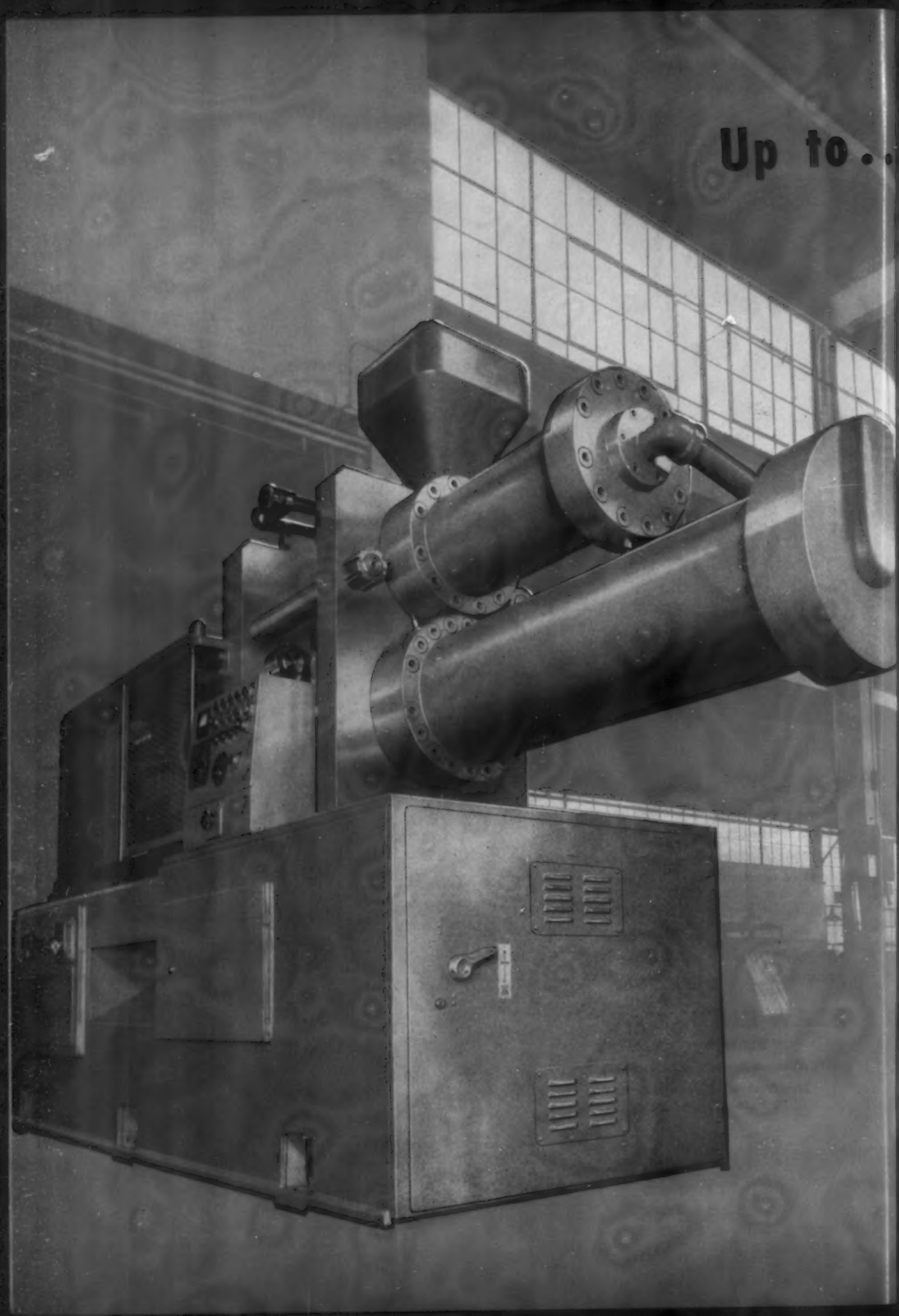


The Blaw-Knox Electro-Vapor System supplies heat, closely controlled, through the entire temperature range of 100 to 700 degrees Fahrenheit. It combines the advantages of electric and Dowtherm heating.

The Electro-Vapor System operates with full efficiency at reduced loads, saves space, is explosion-proof, is simple in principle.

BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY
2116 Farmers Bank Bldg., Pittsburgh 22, Pa.
New York—Chicago—Philadelphia
Birmingham—Washington

BLAW-KNOX *IMPLEMENTS* THE PROCESS INDUSTRIES


Up to . . .

400% Greater Production

- For Molding THERMOSETTING PLASTICS
- FULLY AUTOMATIC CYCLE FROM POWDER TO FINISHED PART

This is the new ROCKFORD HY-JECTOR . . . a high production, automatic molding machine for thermosetting plastics. The simplicity and speed of the molding cycle, typical of conventional injection molding, is now yours in molding thermosetting plastics. All steps of the molding operation . . . measuring, preforming, dielectric preheating, molding by injection into a closed heated die, and polymerizing . . . are performed automatically by the ROCKFORD HY-JECTOR. Set-up of the operating cycle is quickly established by controls at the operating station; each element of the operating cycle is individually adjustable to meet any requirement.

BASIC ADVANTAGES

1 PRODUCTION SPEED . . . entire operating cycle is automatic. No manual interruption required in making preform or in dielectric preheating.

2 PRECISION CONTROL . . . all controls are infinitely adjustable; each element of the cycle, such as preheat time, curing time, ram pressure and preform pressure may be set to provide the ideal condition. All machine operations function simultaneously, properly timed for automatic cycle, and since cycle is automatic chance for error during cycle is eliminated.

3 QUALITY PRODUCTION . . . actual molding operation consists of forcing plasticized preform by ram pressure into a heated closed mold. This type of molding operation plus exact preforming and dielectric preheating combine to produce parts that are uniform . . . free of blisters and porosity. Since material is forced into closed mold, flash is practically nonexistent, eliminating time and cost of finishing. Because the final polymerizing step is also a part of the automatic cycle, completely cured parts are assured.

4 LOWER DIE COST . . . relatively lower molding pressures used result in longer die life. Closed type, low pressure mold design permits relatively greater cavity section and simplified mold construction.

See the ROCKFORD HY-JECTOR at the Chicago Show or write for descriptive bulletin.

PRODUCTION FACTS AND FIGURES

typical parts molded with the 8 ounce ROCKFORD HY-JECTOR

INDICATOR KNOB — General purpose phenolic — 1.2 ounces each — 6 cavities — 40 cycles per hour — solid section

KITCHEN CABINET HANDLE — General purpose phenolic — 0.4 ounces each — 8 cavities — 60 cycles per hour (time includes post insertion of inserts) — heaviest section 3/8"

COVER — General purpose phenolic — 2.2 ounces each — 3 cavities — 70 cycles per hour — 5/16" maximum section

TERMINAL BLOCK — General purpose phenolic — 2.5 ounces each — 2 cavities — 70 cycles per hour — heaviest section 3/8"

ROCKFORD HY-JECTOR

MOLDING MACHINE FOR THERMOSETTING PLASTICS

ROCKFORD MACHINE TOOL CO.

ROCKFORD ILLINOIS

THE *Telechron* THAT *Glows* IN THE DARK

HAVE YOU seen the clock that *GLOWS* in the dark? It's a Telechron. It's attractive enough to look well on any bedside table. And it's easy to locate in the dark. The case is molded of phosphorescent Lustron (Monsanto Chemical Co.).

Horse Head* Luminescent Pigments Make this Clock Case *"Luminous"*

THE *case*, as well as the *face*, of this new "Telalarm Jr." electric alarm clock *glows* in the dark. Its cheery glow adds a friendly touch to a pitch-dark room. This clock, as a "night light," is a natural for children's rooms, and a welcome addition to all bedrooms in the home. And, of course, it has the usual Telechron quality—dependable accuracy and long life, self-starting motor, "control-a-tone" alarm.

Among the many other useful applications for *phosphorescent* types of pigmented plastics are flashlights, lamp shades and fixtures, safety signs, table tops, electric light pulls, switch plates, radio cabinets and dials, door hardware, escutcheons, advertising premiums, curtains and such other items as toys, gifts and novelties. The *fluorescent* types—those that require black light—are readily applied to displays and decoration, radio, aviation and automotive instrument dials.

Many of these applications are illustrated in our new booklet, "101 Useful Luminescent Applications." A copy on request.

*Reg. U. S. Pat. Off.

HORSE HEAD PRODUCTS
New Jersey
zinc

THE NEW JERSEY ZINC COMPANY

160 FRONT STREET • NEW YORK 7, N. Y.

Products Distributed by THE NEW JERSEY ZINC SALES COMPANY

NEW YORK • CHICAGO • BOSTON • CLEVELAND • SAN FRANCISCO • LOS ANGELES

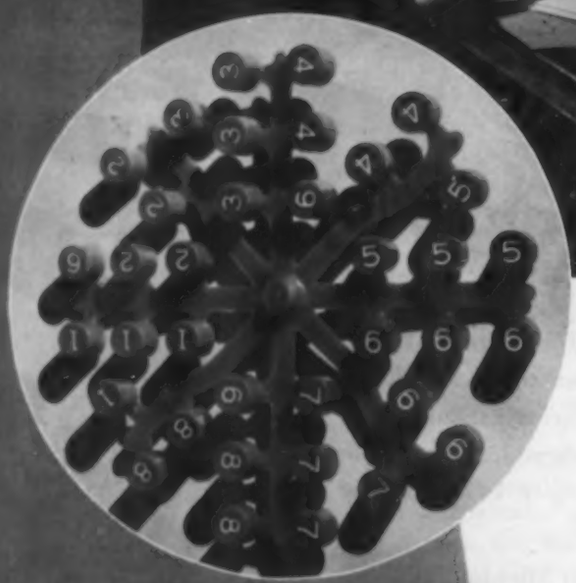
THE complete production run of a special war product totaled 10 pieces. Michigan Molded engineered and produced the parts. Another production run totaled 456,826 thermostat gauges for a famous make refrigerator, and Michigan Molded turned that out in 17 days less than the contract time (along with thousands of other items during the same period).

This production flexibility is characteristic of Michigan Molded attention to detail on every custom plastic job, large or small. If it can be injected, extruded or molded, then we'll help you engineer it into plastic — over a quarter century experience.

MICHIGAN MOLDED PLASTICS, INC.

Dexter, Michigan

PLASTICS for INDUSTRY



CREATIVE CUSTOM MOLDING

Whether the problem is the molding of small items like adding and calculating machine keys or the molding of larger articles, we are qualified to handle the job. If you have a designing, engineering, or production problem in plastics, we shall be pleased to make available the services of our engineering staff.

CRUVER CHICAGO

51st Year in Plastics . .

Cruver

MANUFACTURING COMPANY

2456 W. Jackson Blvd., Chicago, Ill., Seeley 1300

New York – 2 W. 46th St. • Wisconsin 7-8847

Just TUBING
but—it made necessary a bigger, better plant

• So many manufacturers have selected CARTER as their source of supply for plastic tubing—

So varied are the many tubing problems that CARTER has to solve day in and day out—

So extensively have demands grown for plastic tubing of all shapes, dimensions and colors—

So insistent became the need for better facilities and improved service—

Well, in short, so many requirements had to be met that the only solution was *more space.*

So we were forced to move into a much larger factory with three times the floor space. With the new machinery and additional modern equipment being installed our production capacity will be doubled and we will be in better shape than ever before to take care of your needs. It's logical to look to CARTER as your source of supply.

CARTER
PRODUCTS CORPORATION

Manufacturers of Extruded Plastics

10225 MEECH AVE., CLEVELAND 5, OHIO • PHONE BROADWAY 6565

Extruded Plastics

SIMPLIFIED *Process Heating*

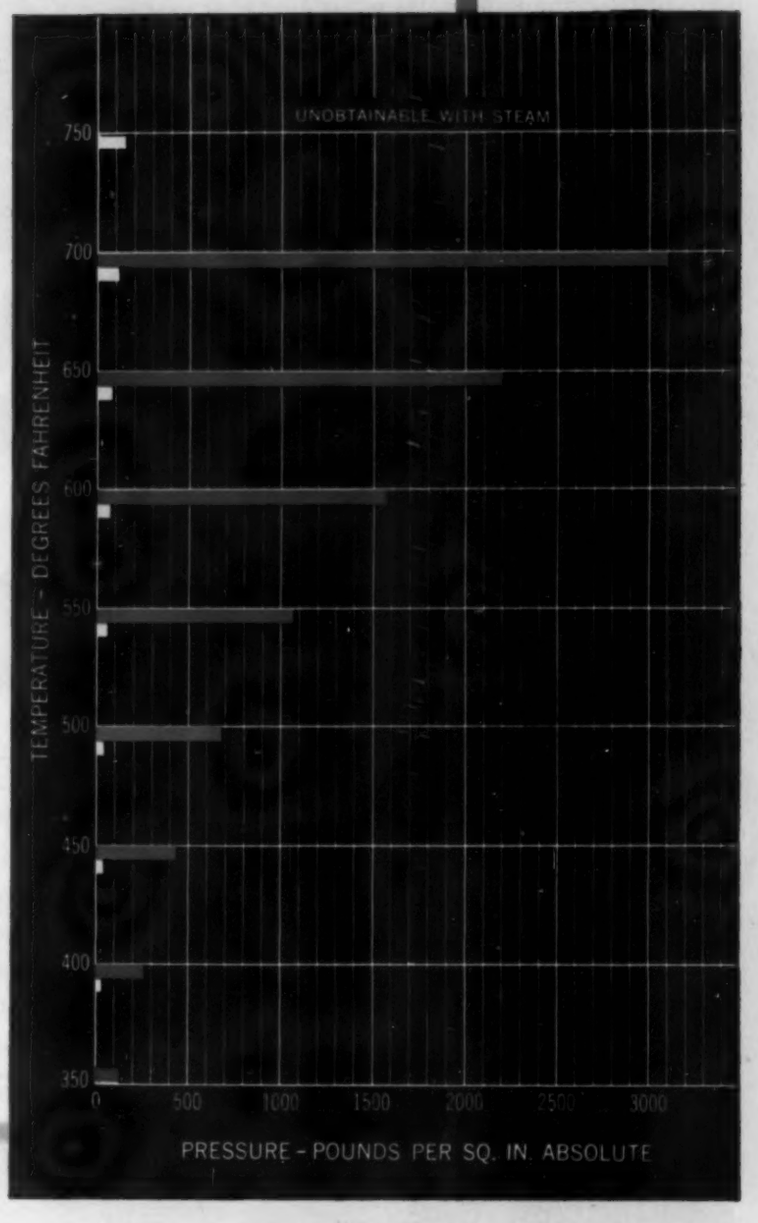
GIVES HIGH TEMPERATURE (700°) AT LOW PRESSURE (88 lbs.)

Evaluate in terms of your present processing method what uniform temperature, high rate of heat transfer, and close control of temperature mean. Add to this the factors of simplified design, permitting you to heat and cool in the same cycle; safety and simplicity in operation; and low maintenance of equipment.

A Foster Wheeler Dowtherm heating system will give you all these advantages, and in addition improve the quality of your product.

If you are looking for greater operating economy, find out what this modern high-temperature low-pressure method can do for you. Address

FOSTER WHEELER CORPORATION
165 BROADWAY, NEW YORK 6, N. Y.



TEMPERATURE-PRESSURE COMPARISON
Dowtherm ▭ Steam ▬

This chart gives a direct comparison between pressures in FW Dowtherm heating systems and those encountered in steam systems for the same working temperatures.

FOSTER WHEELER

MODERN *as Tomorrow...*

Tougher than leather, stronger than fabrics, MIRALON, the vinyl miracle, is fast becoming the preferred material for thousands of products such as:

Curtains	*Shower Curtains*	*Aprons*	*Handbags*
Hangings	*Watch Bands*	*Bibs*	*Brief Cases*
Upholstery	*Shoes*	*Bowl Covers*	*Wallets*
Floor Covering	*Umbrellas*	*Tablecloths*	*Garment Bags*
Wall Covering	*Book Binding*	*Luggage*	*Raincoats*

Available in any color, any texture, any gauge . . . plain, designed, printed

Where strength, texture, and beauty are required,

use MIRALON —the Miracle Material.

Manufactured by TEPPER-FIELDS CORP., 8-67 Astoria Blvd., L. I. City, N.Y.

DISTRIBUTED BY

CHARLES S. FIELDS, Inc.

792 STERLING PL., BROOKLYN, N. Y. • PResident 4-1560

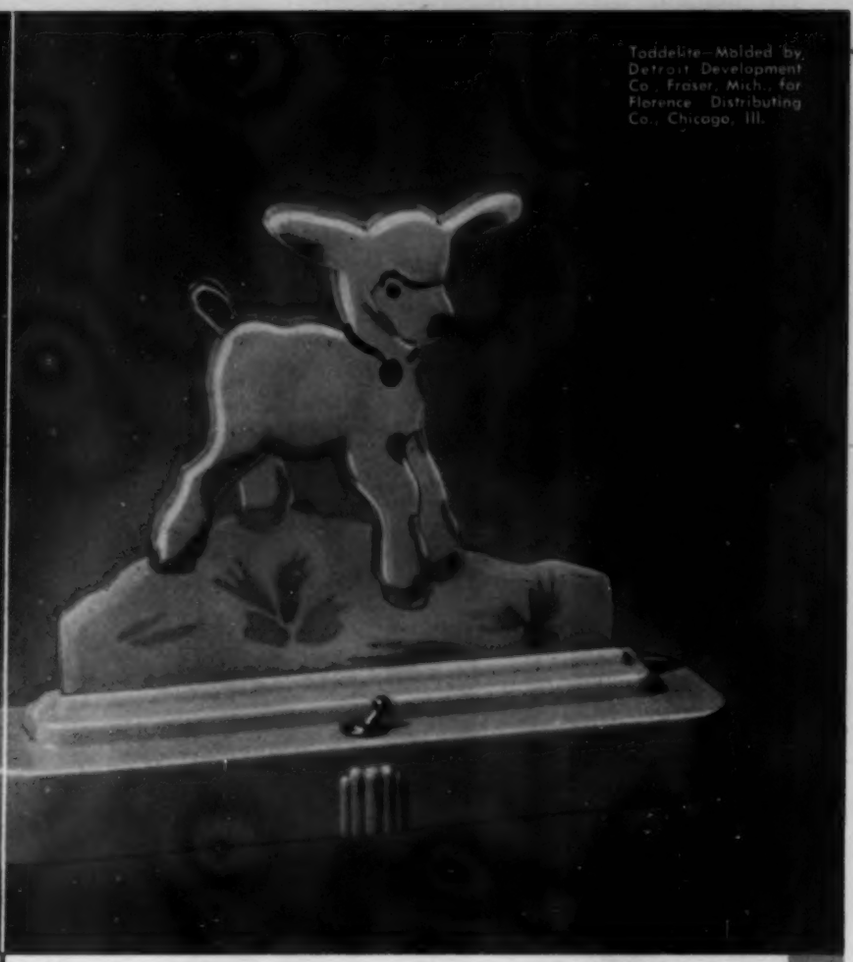
MIRALON

THE MIRACLE MATERIAL

Lustron

A MONSANTO PLASTIC

quality in a new light



Toddelite—Molded by Detroit Development Co., Fraser, Mich., for Florence Distributing Co., Chicago, Ill.

This nursery night light is:	*Because:*
NOVEL	Lustron's fine and unusual light diffusing and carrying qualities create a unique lighting effect.
PRACTICAL	Lustron has outstanding electrical properties and dimensional stability; it is sturdy and long wearing; light weight and easy to clean.
LIGHT WEIGHT	Lustron's low specific gravity makes it one-third the weight of alternative materials.
SAFE EYE APPEALING	Lustron is shatterproof. Lustron is sparkling, available in the widest range of colors, attractive night and day.
ECONOMICAL TO MAKE	Lustron's low pound cost, light weight resulting in more units per pound, its adaptability to low cost molding processes, and the elimination of finishing processes, add up to profit-making economy.

MONSANTO
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These important qualities and others, make Lustron, Monsanto's polystyrene, the most versatile of all plastics. Put them to work for you in your products! For complete information and technical assistance, address: MONSANTO CHEMICAL COMPANY, Plastics Division, Springfield 2, Mass. In Canada, Monsanto (Canada) Limited, Montreal, Toronto, Vancouver.

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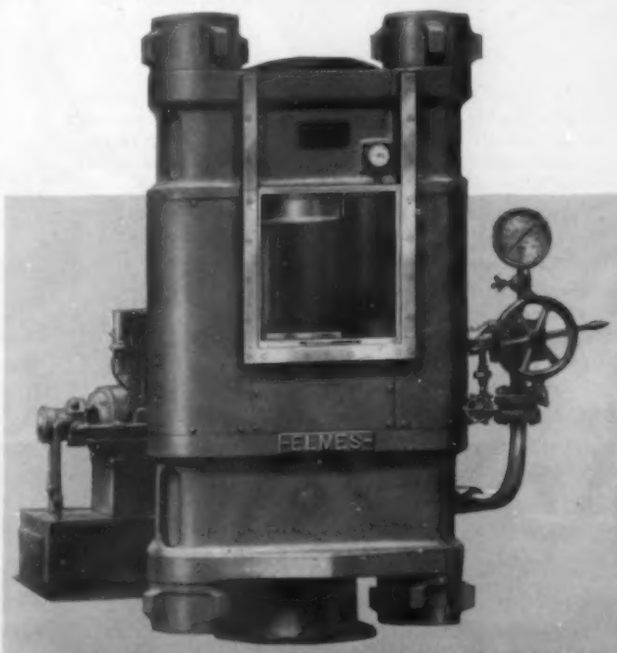

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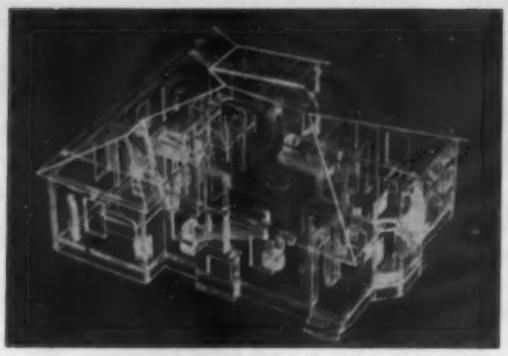

Plastic to plastic adhesives. Fabrication and assembly of sheet plastic to itself, results in many attractive combinations. The architect's scale model house shown above was built by a Plastics Institute student. Components were all assembled with solvent type adhesives.

ADHESIVE PROBLEMS

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Encyclopedia

1947

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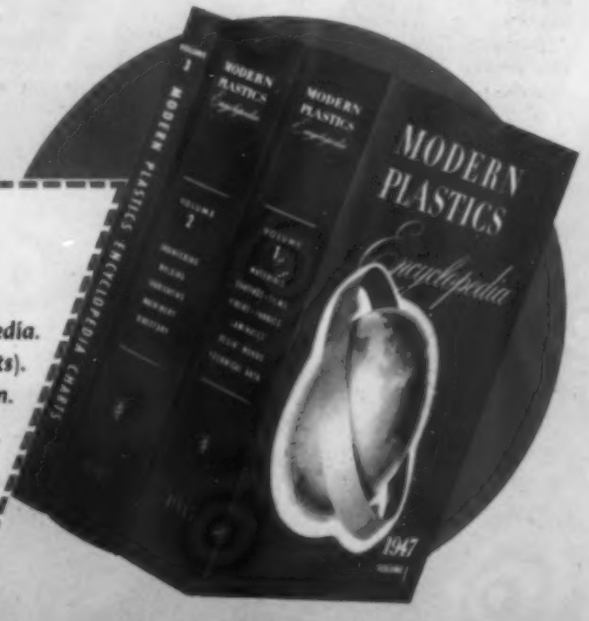

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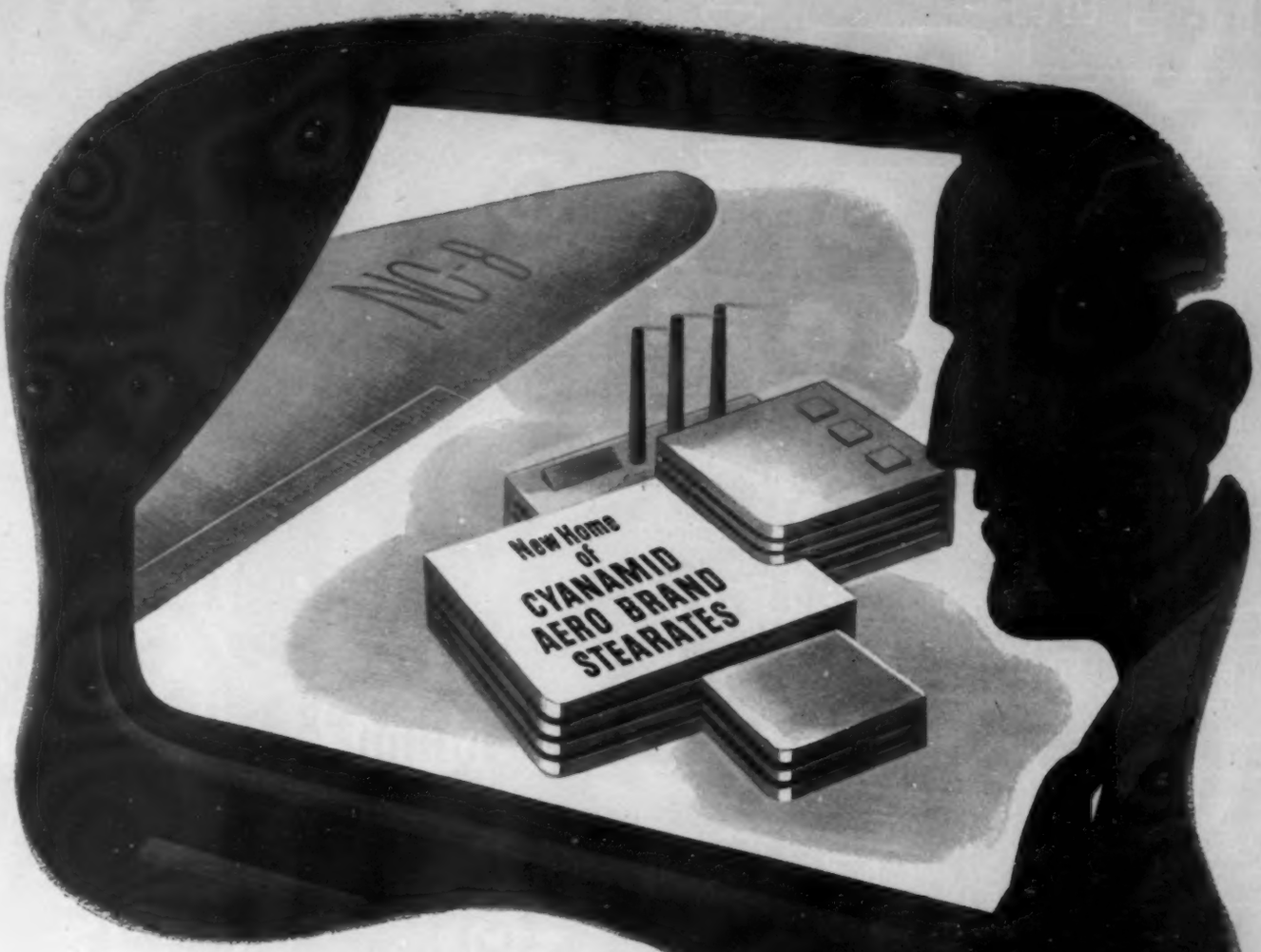

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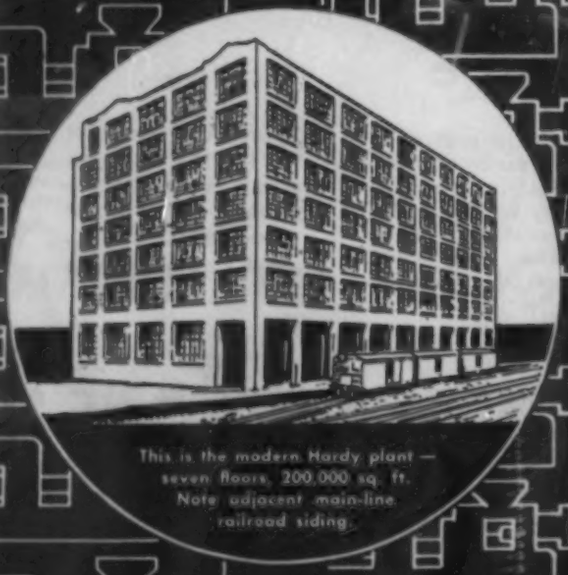

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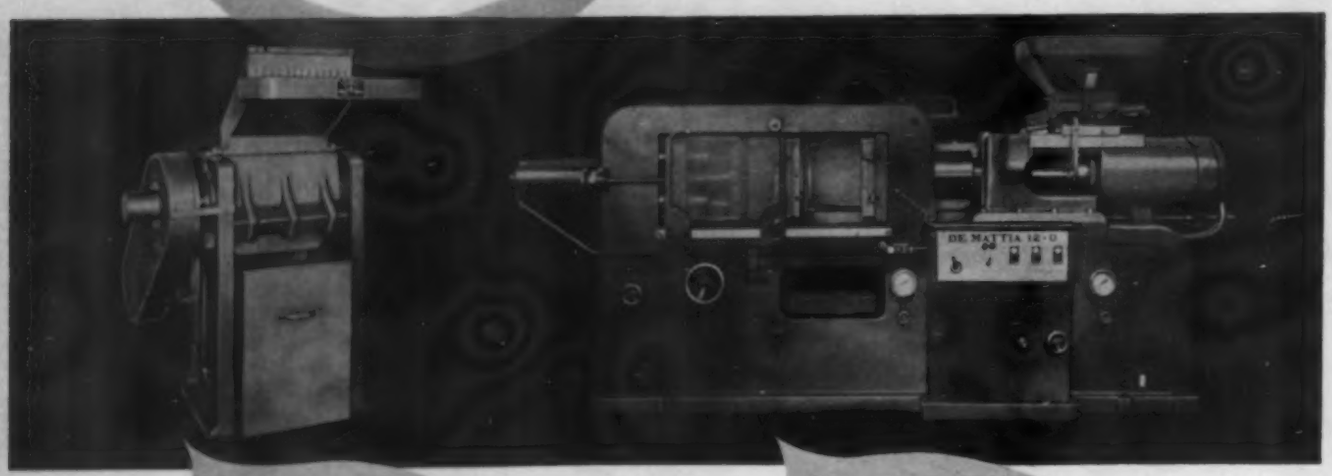

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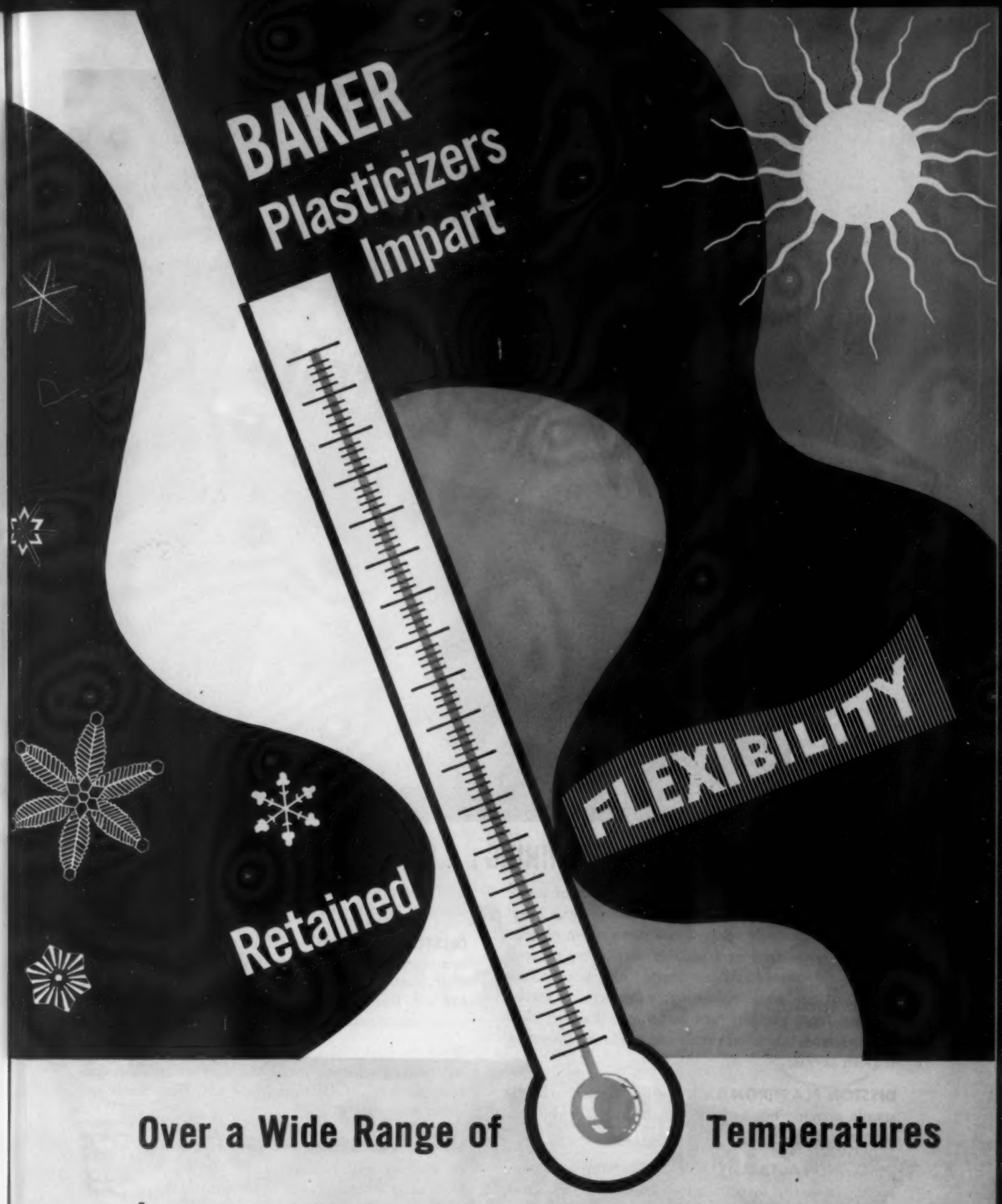

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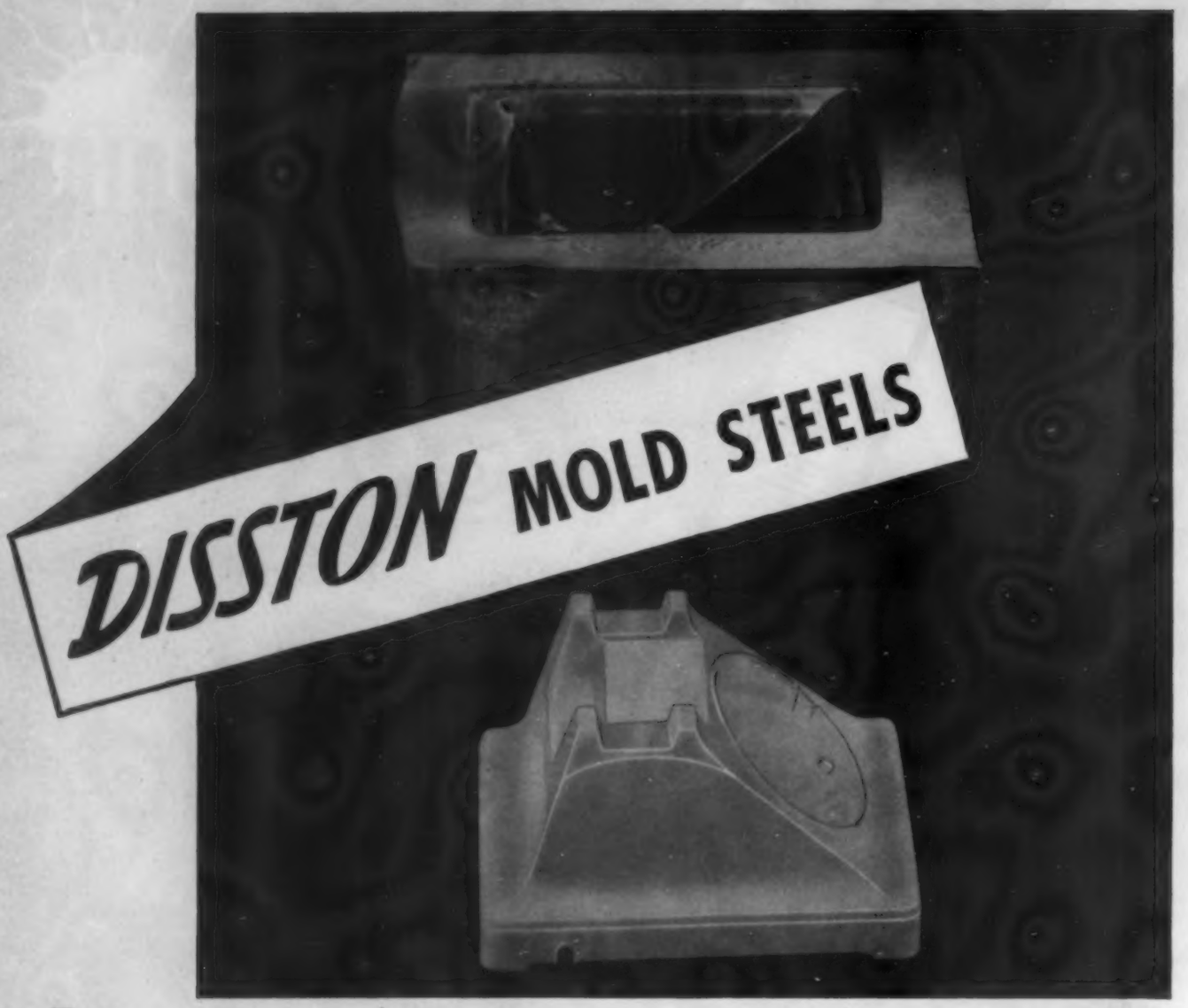

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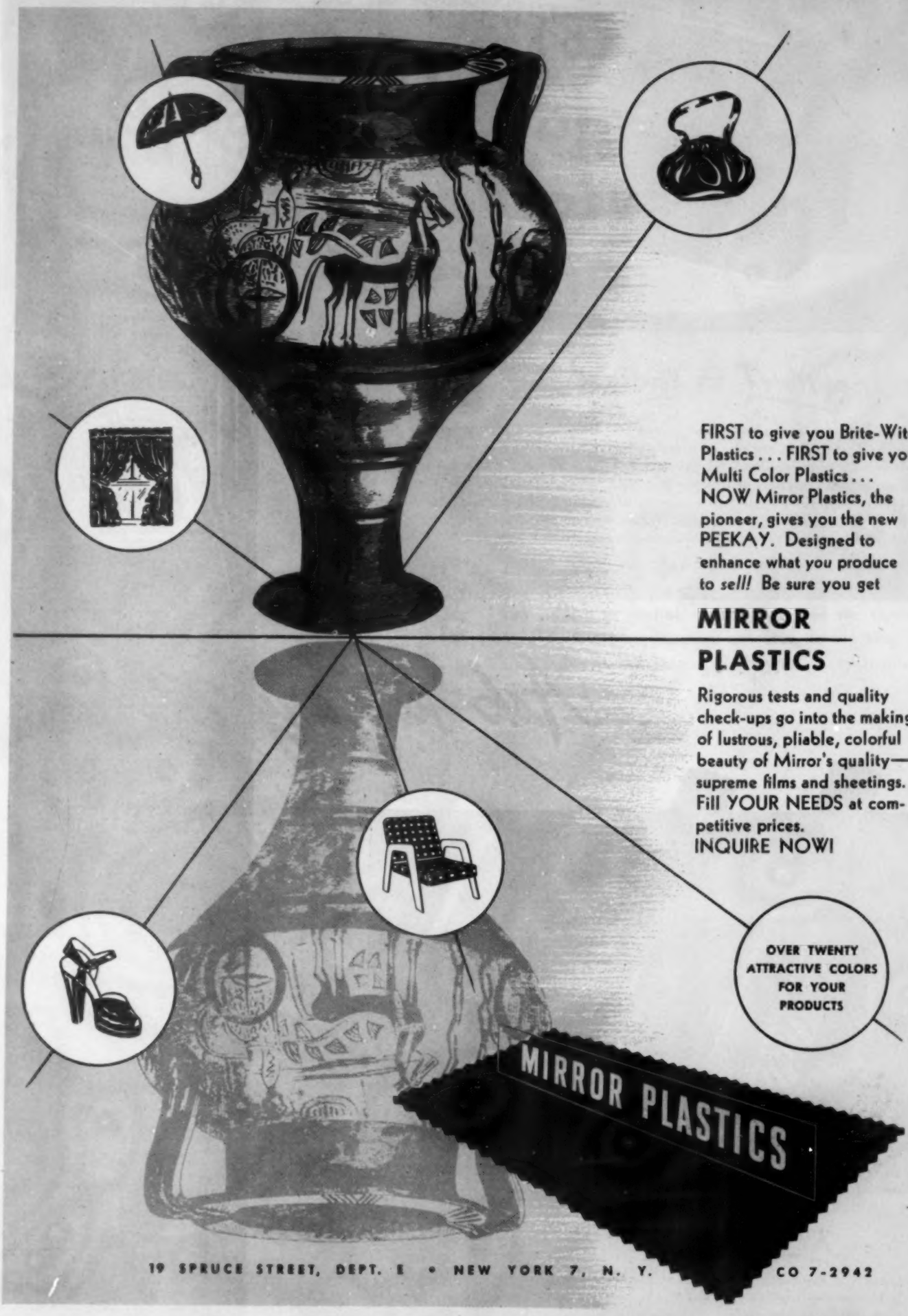
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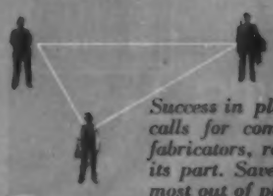

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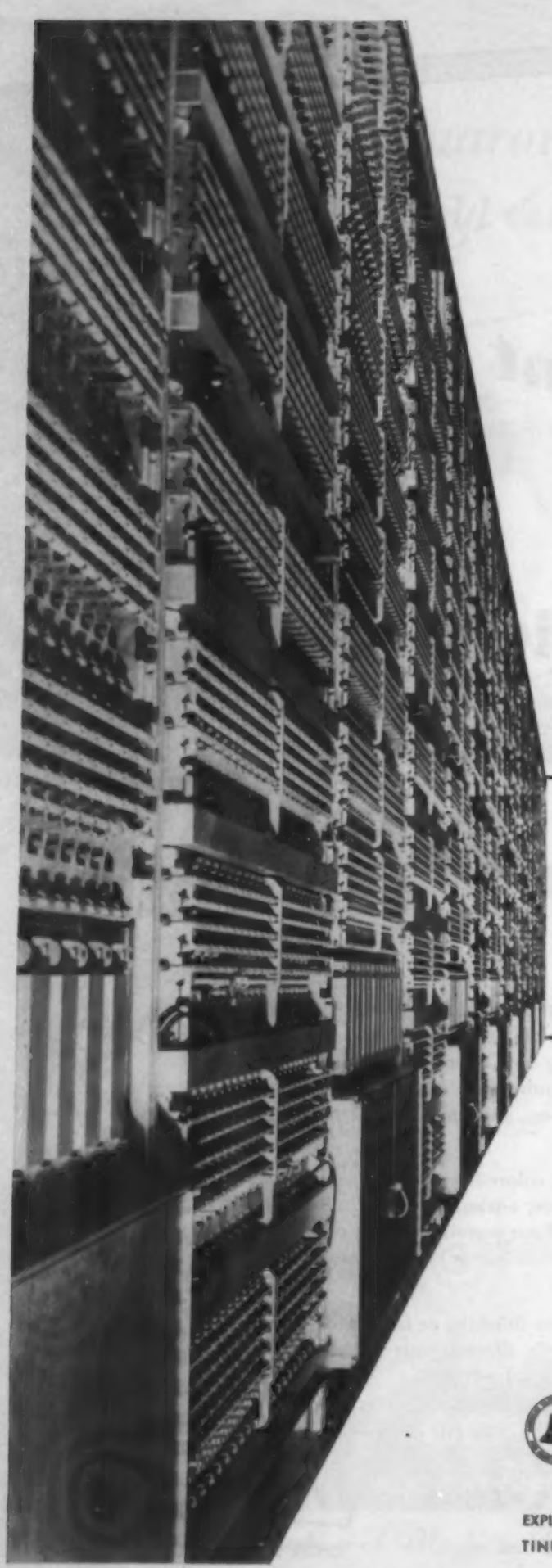

WHEN you spin the dial of the latest type of telephone system—known as "common control switching"—you order into action a giant nervous system. It sends electrical impulses through an intricate maze of circuits: more than 10,000 contacts can be opened or closed in a single dial call.

This system takes your order, remembers it, translates it into its own electrical language, throws out sensitive "feelers" to find a through route, plans how to make the connections, makes them, puts through the call—and, if the preferred paths are busy, finds an alternate route to take the call.

The complex art of telephone switching is brought to a high state of development at Bell Laboratories to serve the Bell System. Some day through "common control switching" a dial in San Francisco may set up a connection through to a subscriber in New York.

■

Left: Backstage on your dial telephone call—some equipment in a typical "common control switching" office.

Bell Telephone Laboratories

EXPLORING AND INVENTING, DEVISING AND PERFECTING FOR CONTINUED ECONOMIES AND IMPROVEMENTS IN TELEPHONE SERVICE

O'Sullivan's Statement of Plastic Policies

The O'Sullivan Rubber Corporation presents the fundamental policies which will guide its operations in the manufacture and sale of its new line of calendered thermoplastic films and sheetings. In presenting these policies, it is conscious of its more than 50 years of manufacturing integrity—the substantial sum of money used in advertising the O'Sullivan name—and its standing in the minds of the American consumer. Summed up, O'Sullivan policy applied to its Pedigreed Plastic line aims to:

1. Develop sound formulations for specific applications.
2. Provide technical service on plastic sheeting and film to industrial users.
3. Cooperate with the user in the performance testing of end products.
4. Maintain uniform quality by utilizing highest grade materials, modern equipment, and efficient laboratory control of production.
5. Protect the consumer by restricting the use of its Pedigreed Plastics to practical applications.

This is O'Sullivan's pledge to the plastics industry.

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Booth No. 306
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Chicago, May 6-10

Earl Bunting

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new resins derived from FURANE

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STRENGTHEN ASBESTOS SHEETING — Thinned to 50 percent solids with alcohol or acetone, Furetone 1252 increases the strength and rigidity of asbestos sheets and boards without affecting their flame resistance.

BOND FIBERGLAS CLOTH with either hot or cold setting Furetone 5510A and accelerator. 5510A, a 100 percent solids, viscous, thermosetting resin, is inert to acids and alkalies.

For generous samples of these resins and technical assistance in their use, write to the Irvington Varnish & Insulator Company, Irvington, New Jersey.

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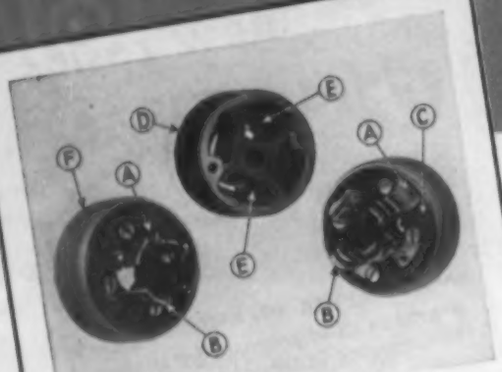
PLASTICS

is a Work Horse, too!



MOLDING MATERIAL
Amerine, one of the cold molding compounds developed by Aico; was selected for the caps because of its excellent electrical and heat insulation properties. A black general-purpose phenolic was used for the body.

MOLDING METHOD
The phenolic body is compression molded in a 4 cavity hand mold at a rate of 500 per day. The caps are cold molded in single cavity molds.

MOLD DESIGN
Four metal inserts (A) in each cap provide firm anchorage for contacts (B). In addition, the cap for the live end of the coupling has 2 threaded inserts (C) to receive the screws which assemble it with the body. The body (D) is molded with a separate compartment (E) for each contact to provide positive insulation. Body (D) is rotated to securely lock connection after contacts (B) are inserted in slots (E). The armor (F) on the caps protects them from damage by rough usage.

The eye appealing colors and bright finish of many types of plastic materials make them the logical choice for use in parts which must combine beauty with utility. There are equally efficient but less glamorous plastics which are designed primarily to reduce manufacturing costs and produce superior results. American Insulator's original cold molding compounds belong to this group.

AICO engineers, backed by more than 30 years of precision molding with all materials and methods, are fully qualified to make recommendations for their application to your needs.

This is number 33 of AICO's series of plastics applications. A request on your letterhead will bring you the set, complete to date, in convenient file form.

Aico
PRECISION MOLDING
for over 30 Years

AMERICAN INSULATOR CORPORATION
New Freedom, Pa.
SALES OFFICES: Cleveland — Detroit — New York — Philadelphia

MANY THINGS ARE BETTER BECAUSE OF PLASTICS

MODERN PLASTICS

VOLUME 24 MAY 1947 NUMBER 9

Merchandising

The plastics industry's number one problem

GENTLEMEN, you have a simple choice: *sell* your goods and services, or get out of business!

You built in this industry a huge machine for making plastics products and products with plastics parts. It is capable of producing over six times as much as the machine you had in 1939, and it is getting more efficient every day. But the things it makes can clog it up if you don't move them out of the way! You can move those goods by selling!

Your selling will be directed to a huge and growing market. But it is a buyer's market; and that is new to you. This market started last December when supply of some products began to catch up with the backlog of postwar demand. It started in luxuries, then embraced soft goods, and now, except for automobiles and a few home appliances, is apparent in all lines, even housing.

The rules for successful selling to a buyer's market are neither secret nor complicated. Older industries have known them for years and will soon be applying them with vigor. Because many plastics processors and users may not understand these rules fully, we have devoted the next several pages of this issue to articles explaining them in detail, as they apply to plastics. Here they are:

1. *Don't try to sell junk!* A buyer's market is a market based on value and utility. It is no secret that a relatively few plastics misapplications have done plastics as a whole quite some damage in public appreciation. Test your designs and your pilot products and perfect them for use before offering them. If you don't, retailers will stop them at your plant. See page 100.

2. *Lower your prices!* Today, efficient production at low cost will enable you to price your products competitively. See page 98.

3. *Keep your pipelines clear!* Manufacturers' inventories reached an all-time high of $20.6 billion in January; and sales from plants were only $13.3 billion. Wholesale stocks are increasing at a much faster rate than sales, even on durables in heavy demand. Meanwhile many retailers have set inventory limitations. Make sure that your product is clearing through to the retailer. Follow it up with merchandising to keep it moving out into consumption. See page 102.

4. *Analyze your markets!* Where the most people with some money to spend are located—there you'll sell plastics products. Find out where these markets are and concentrate on them. See page 94.

5. *Feature new merchandise!* The public wants good *new* merchandise; and retailers, by hand-to-mouth buying, mean to see that a flow of new products moves through their stores. Don't copy. Create!

6. *Study your outlets!* Plastics products are possible of sales in a wide variety of outlets. Careful study is required to determine which to cultivate first and how to go about it, because each type of outlet has its own merchandising, pricing and inventory habits. See page 100.

7. *Package your goods!* Merchandise that is easily handled, easily and quickly sold, and readily displayed, with no chance of loss through shop handling, will be given preferred treatment by retailers. See page 102.

8. *Use really informative labels!* Many companies are using so-called "informative" labels as a gesture toward the buyer's market. Few are doing the job as it should be done. See page 106.

9. *Do an industry selling job!* Plastics are relatively unknown to the public at large, so the industry needs a strong consumer education program. Plastics are targets for press and radio comment, much of it ignorant but likely to harm your future sales by either falsely based criticism or unwarranted promises of miracles. The industry needs a regular public relations campaign. Plastics merchandising needs some overall coordination; therefore the industry needs a standard form of informative labeling based on acceptable and recognized consumer standards.

You have to merchandise . . . . or fold up!

MARKETS.... present and future

Trend in incomes, store sales, industrial indices and trends in population all affect marketing plans

MARKETS are people with money to spend—and the desire to spend it.

The first step in preparing to market a product is logically taken even before the product is designed. That step is market analysis, to determine not only where the people are, but roughly how much money they have, what kind of people they are, how they are grouped by ages and sexes, what their living and cultural habits may be. From these factors may be determined the effects of standards of living, climate, habits and even heredity on people's desires so that a product may be designed and engineered in the size, shape, style, color, and weight to appeal to the greatest number of people living in that area.

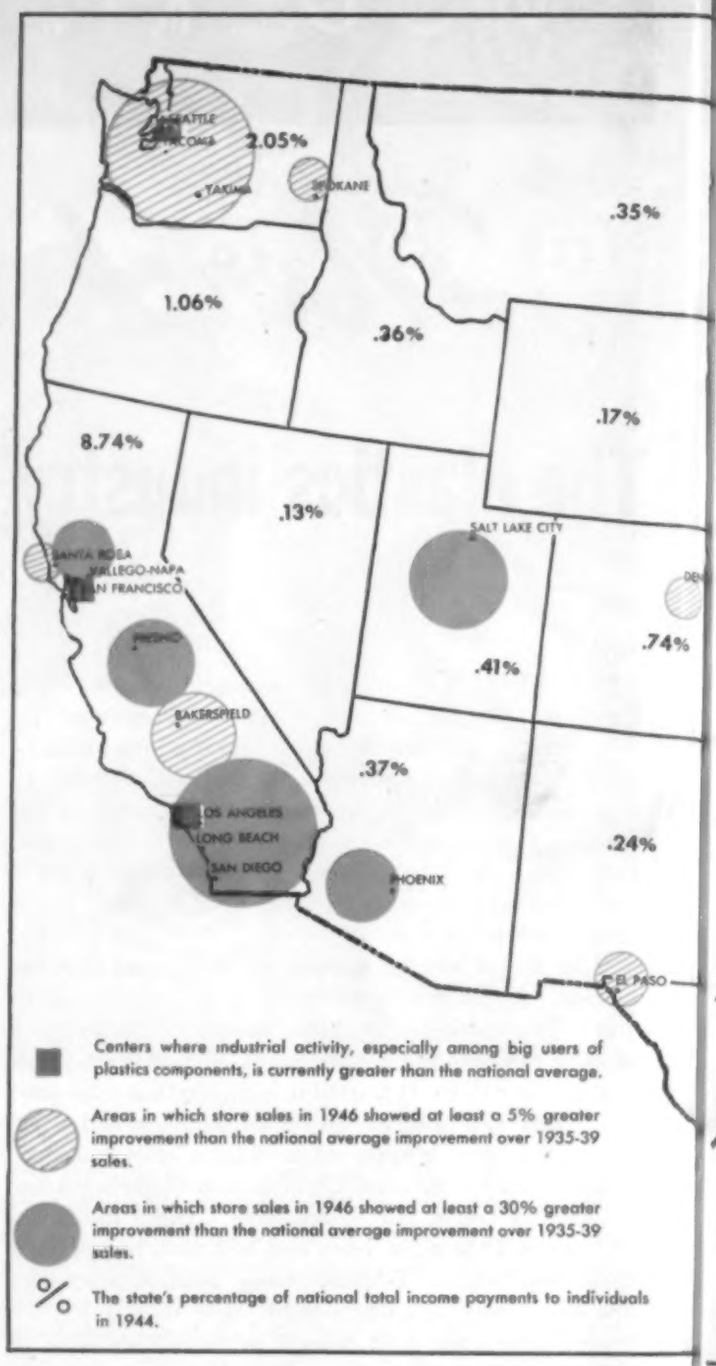
Trends in store sales and in incomes

The map (Fig. 1) provides a rough guide to present markets—a starting point for analysis. The orange striped disks mark areas where store sales in 1946 generally showed an improvement slightly greater than the average national sales improvement over 1935–39 levels. Solid disks mark spots where 1946 store sales were at least 30 percent better in improvement over the 1935–39 levels than the national average. These spots show where the people with more money to spend are living today.

The reader should not be confused by the solid orange disks shown in thinly populated areas. To emphasize that the solid disks show only *relative gain in sales*, there is marked on each state the percentage of income payments to individuals, which the people of that state enjoyed out of the total United States income payments in 1944. Thus, comparatively greater improvement in retail sales in Utah, Arizona, Virginia and Florida will still represent only a tiny fraction of sales in Pennsylvania, New York, Illinois, Ohio or California.

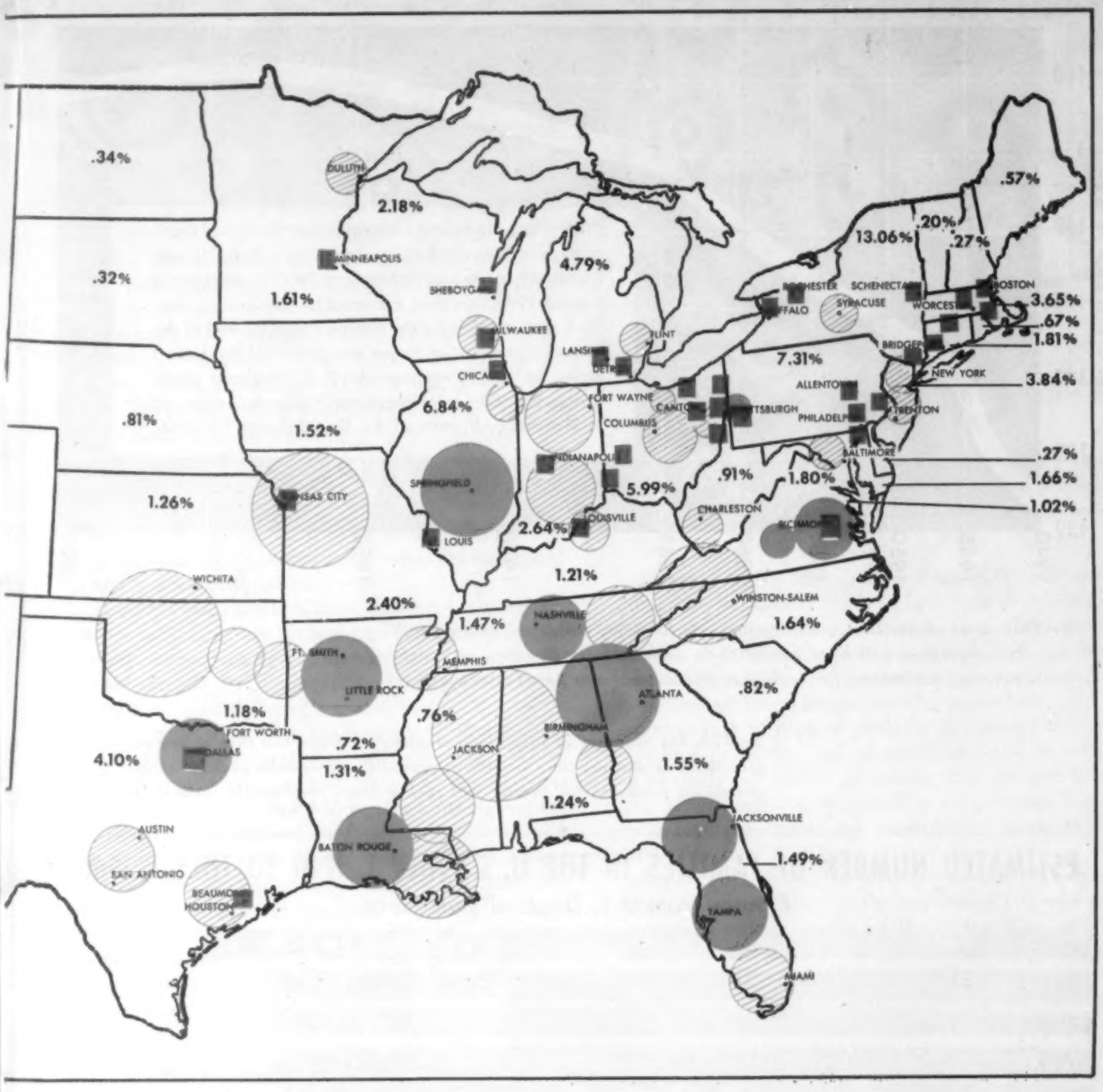
Consider migration of population

A depression and a war have caused a great migration to the West Coast and the South, with the Central States as the losers. The migration was one of workers who represent mass markets for plastics products.



This retail sales and population migration picture, as judged from the map, is lacking several important elements. There was a wartime migration of women, mostly young, from rural areas to cities of over 100,000 population. Farm areas lost 11.3 percent of their female population; large cities gained 13.1 percent in female residents, and smaller cities, 9.5 percent. These women, at least until married, are likely to remain in the cities. So, for the immediate sales period at least such products as handbags, dress accessories, shoes, buttons, cosmetic containers, combs should be pushed to these urban areas, particularly through department store and variety chain outlets.

Studying the relative purchasing power of the various areas, economic common sense would indicate that the



1—*Location of solid orange and striped disks is based on a consumer market analysis by J. Walter Thompson Co., a report on department store sales in the Jan. 15, 1947, issue of* Modern Industry, *a report on postwar migration in United States made in Feb. 1947 by Bureau of the Census, Department of Commerce. Green squares' locations are based on a* Modern Industry *report adjusted by output statistics in appliances, radio, other fields normally using plastics*

new prosperity in the South will be translated into purchases of low-priced merchandise, not into luxuries. The South and California both lead in increases in birth rate, so should be good markets for baby specialties.

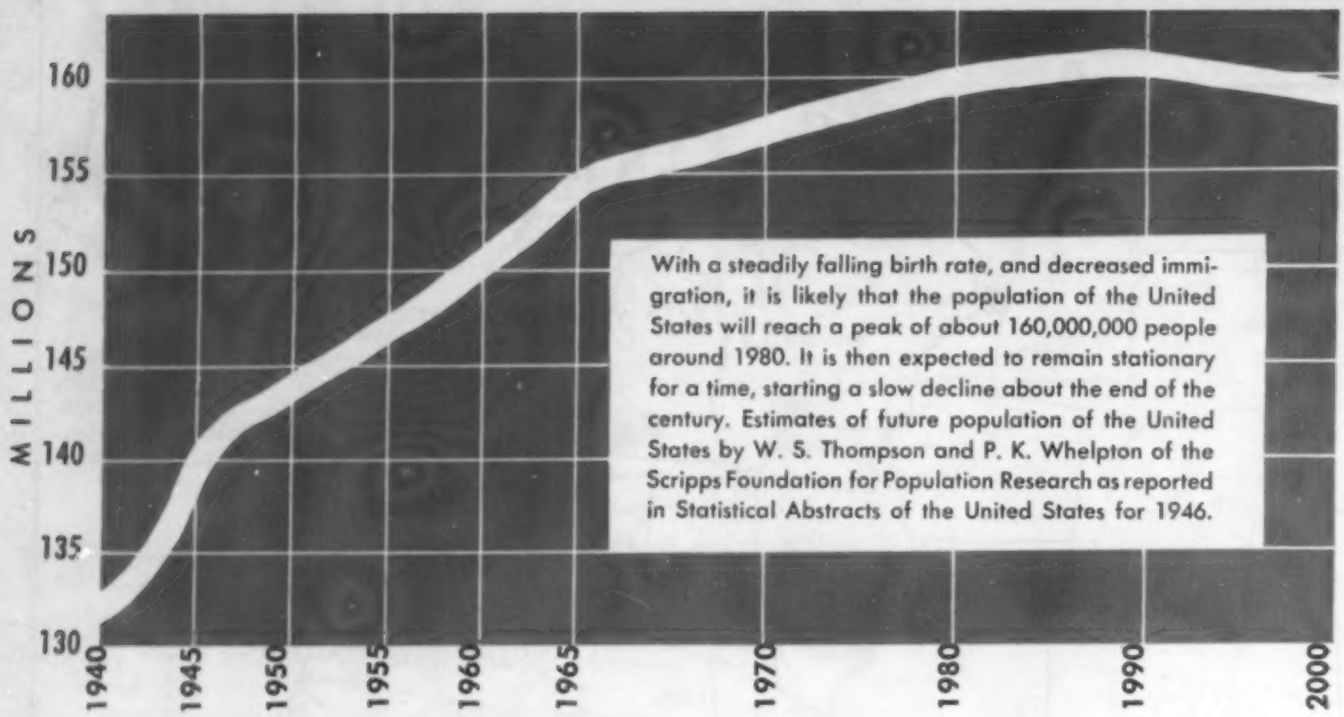
Significance of industrial activity

The green squares on the map mark districts where industrial activity is currently greater than the national average. From the standpoint of the custom molder of plastics components, it may be seen that his product sales' routes will be fairly simple to cover.

The green squares don't show, however, which industries are currently using the most custom molded parts, and in what kinds of goods. Here are a few facts and conservative forecasts for the first five months of 1947, from data supplied by Standard and Poor's Corp.

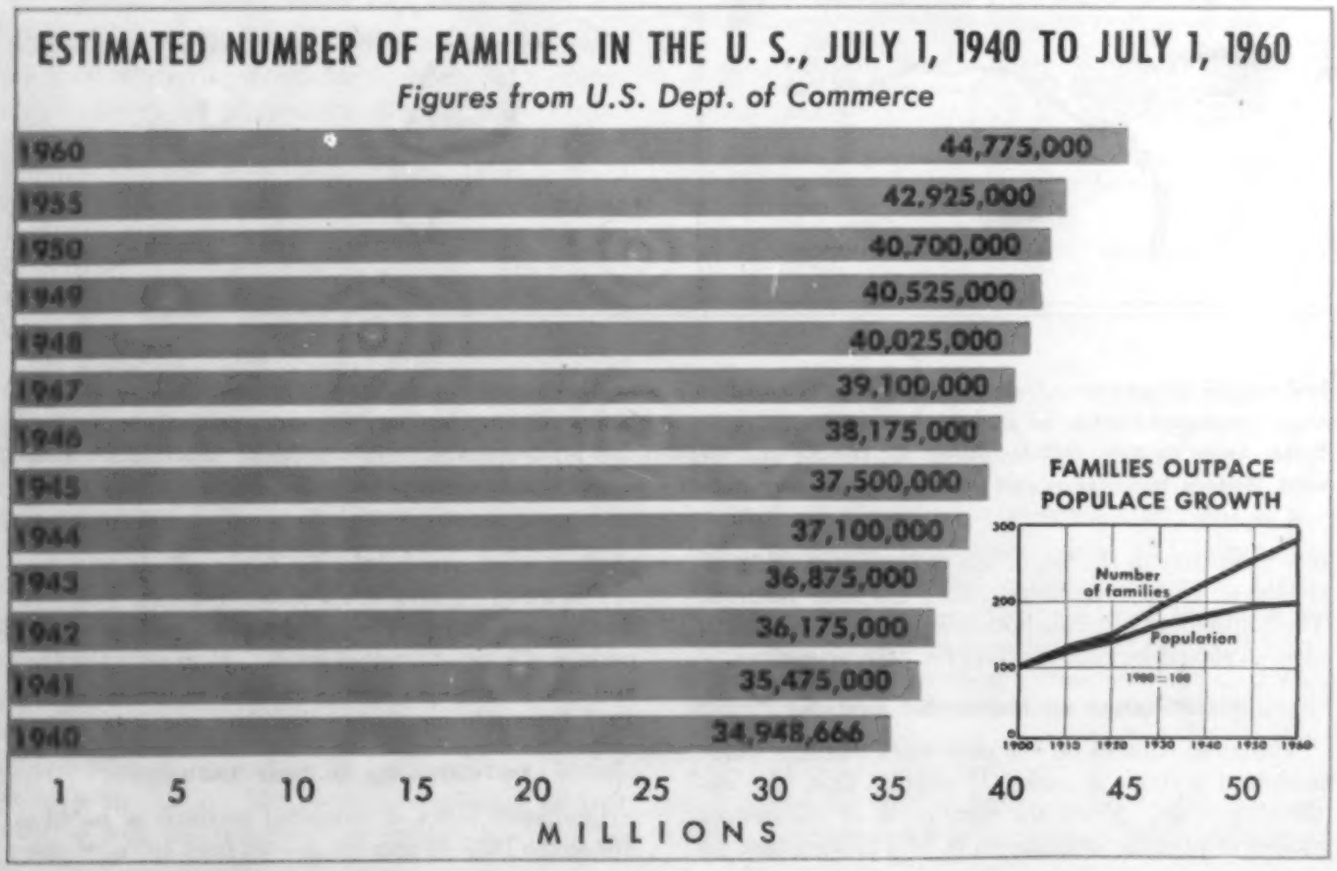
Activities up in four industries

Composite index of industrial production, based on 100 as the 1935–39 average, moved from 160 in January



2—This chart shows that quantity markets for toys, childrens' clothes and infants' accessories will have passed their peak in next 30 years, although with increased purchasing power, higher priced items may have better markets

3—With the number of families increasing at twice the rate of population growth, it is obvious that long-term production and sales policies should be geared to products for family use rather than for strictly individual use



1946, to 181 in December. Forecasts for 1947 are: January, 188; February, 189; March, 189; April, 187; May, 186—levelling off, but at a high level.

Automobile production in 1946 averaged 258,000 cars and trucks per month. Forecasts for 1947 are: January, 358,800; February, 370,000; March, 425,000; April, 450,000; May, 450,000. New highs will be set!

Building construction contracts for 37 states averaged $623.2 million a month in 1946. Forecasts for 1947 are: January, $571.6 million; February, $525.0 million; March, $650.0 million; April, $750.0 million; May, $750.0 million. Gains will be great, if prices don't drag the pace.

Shoe production averaged 44.23 million pairs a month in 1946. Forecasts for 1947 are: January, 45.65 (million pairs), February, 46.00; March, 47.00; April 45.00; May 44.00. Consumer demand is due to slacken chiefly because of high prices.

Electric power production in 1946 averaged 18.59 billion kilowatt hours a month. For 1947 the prospects are: January, 21.20 (kilowatt hours); February, 18.85 March, 20.50; April, 20.15; May, 20.40. Big gains in plant equipment will permit use of many new appliances in newly connected homes.

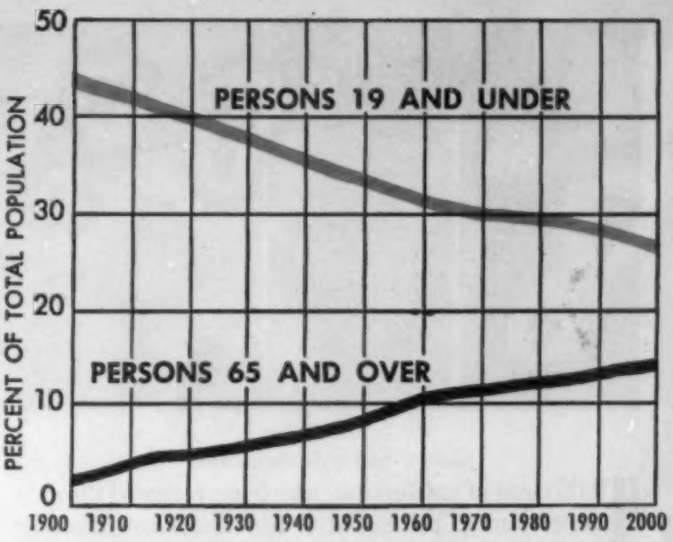
Obviously hard goods makers and durable merchandise manufacturers are the best continuing prospects for custom molding services. The custom molder will have to study his industrial prospect's market position on all his lines if he is to offer effective service.

Those green squares on the map are of vital interest also to the manufacturer of proprietary items. Where a square is near or in a solid orange or striped circle on the map, there are likely to be new houses going up, old houses being repaired for families of workers with steady incomes. These are the markets for family-use products, for kitchen gadgets, shower curtains, children's apparel, home appliances, garden hose, furniture, home lighting equipment, small radios and again, toys. These will be the markets for popular makes of automobiles, small boats, low-cost television sets and home amusements, whenever these are available in sufficient quantity.

Plastic markets of the future

What of future markets? Here, we cannot produce any maps. But we can point out certain population trends on which may be established long-term manufacturing and sales policies in the plastics industry. The bases of Figs. 2, 3 and 4 were provided by Dr. Vergil D. Reed, associate director of research of J. Walter Thompson Co., and former acting director of the United States Census Bureau. They have been given further projection by reference to population trend predictions in the Statistical Abstracts of the United States for 1946.

Figure 2 shows that, with an anticipated falling birth rate and with continued low percentage of immigration, we can expect the population of the United States to reach a peak of about 160,000,000 people about 33 years from now.



4—This chart shows that the average consumer is getting older, so the long-term trends in design of many products must consider the needs of middle aged and older people

Figure 3 shows that there will be 10,000,000 more families in the United States in 1960 than there were in 1940—an increase of 30 percent. But the average number of persons in a family is dropping (it fell from 4.1 in 1930 to 3.8 in 1940) so that the number of families is increasing twice as fast as the population. To a manufacturer of plastics products this means that his long term production and sales policies should be geared to products for family use rather than for individual use. Home appliances, building components, furniture, family vehicles, are examples of products for family use.

Figure 4 shows that the average consumer is getting older. The percentage of the population 19 years and younger is getting smaller and by 1960 will be only 30 percent of the total. The percentage of people 65 years and over is getting larger and by 1960 will be 10 percent. A greater proportion of people will therefore be in the productive range, between 20 and 59 years of age; and a greater proportion of those will be in the middle age range. This means bigger markets for products used by older people, such as leisure accessories, travel goods and comforts. Already an improved market for hearing aids, electric heating pads and blankets, fishing tackle, garden tools, furniture and boats is becoming apparent. And a peculiarity of this higher age market is that it is brand conscious.

The past 30 year period has been one of increased decentralization. Urban populations grew slightly during the war, but the general trend is already reversing. Increased suburbia will mean the location of more and more department store branches outside of urban centers, an increase in independent service stores and an increase in number of units in chains. It will add a new importance to shipping weight of products—a factor which is, of course, quite vital to the merchandising of plastics.

THE costs of production, which are reflected directly in consumer prices, have perhaps more influence over product design and means of distribution and promotion than any other single factor.

The problem of bringing down the costs of producing plastics articles to improve their competitive position in the mass market is complicated by the inelasticity of labor and management costs which are difficult to reduce from their current high level. The only remaining means of reducing costs lies in the attainment of greater production efficiency.

This efficiency can be achieved in three ways:

1. Through the exploitation of all the accessory equipment that has been developed to speed and improve plastic production.

2. Through the installation of new molding and extruding equipment.

3. Through the rebuilding of entire plants so that the flow of operations is smoother and, therefore, more economical.

Use of new accessory equipment

The results achieved by the use of high-frequency generators for the preheating of thermosetting materials are indicative of the cost benefits molders can enjoy if they take advantage of new developments in the processing of plastics. It has been proved beyond the shadow of a doubt that preheating with this type equipment not only reduces molding time very considerably but makes possible the production of certain parts that had heretofore been beyond the scope of the plastics industry.

Now there is available a new molding machine which combines the advantages of high-frequency preheating and molding in one completely automatic and self-contained piece of equipment. This machine is described in detail on page 135 of this issue. Another recently introduced plastics production refinement is a method of preheating with steam and infrared heat. Already this technique has proved that it can save a molder money. Then there is a method for compounding thermoplastic materials, which cuts the steps involved in this work from three or four to one. The inventor of this process claims a saving of from 8 to 10 cents a pound on cellulosics.

There are other developments, like the ones mentioned above, which promise material savings in production costs. It is up to the processors to keep themselves informed of these new methods and machines so that they can place themselves in the best possible position in the present highly competitive markets.

Installation of new presses

The introduction of new and novel molding methods and equipment is but one answer to the problem of achieving greater production efficiency. Almost every molding plant today has at least a few presses that should be consigned to the junk heap. In 1941 the molding industry had 8000 compression presses. It would be safe to say that at least 2000 of these—or 25 percent of them—were long past their prime.

There are few plants that do not have some old time presses which require all too frequent re-packing. Scored rams will chew away a packing in a very few weeks. The consequence of the continued use of these presses is a high rate of downtime while the presses are being re-packed and a high operating cost due to the loss of high and low pressure water or oil. Furthermore, presses of this type are, of course, notoriously slow closing units.

Increased output at saving

Although at first glance it would not appear that the 2 or 3 sec. lost in closing is of any great importance, the following example will point up exactly how costly a unit of this type can be. If a 10-cavity mold is operating on a $2^1/_2$-min. cycle, there will be approximately 1000 cycles per day. If the closing and opening time on this press are both 5 sec., a total of 10 sec. per cycle would be used in opening and closing the mold. (Many old presses are not equipped with pullbacks and the opening time of these presses may run as high as 10 or 15 seconds.)

Multiplication of these 10 sec. by 1000 cycles per day gives a total of 167 min. consumed each day in the opening and closing of the mold. These 167 min. do not include the dwell time (which may or may not be

necessary) but merely the elapsed time required to run the mold up until the force plug is in contact with the material and the length of time required to open the mold in order to eject the part. If this closing and opening time are reduced by 50 percent, there would be a saving of approximately 83 min. a day which, on a $2^1/_2$-min. cycle, figures out to approximately 65 shots per day.

If the piece price of the hypothetical part being turned out is $50 per thousand, the increased production possible with a new press would have a value of a little over $31 per day or $190 per week. When such savings and increased production can result from a $2^1/_2$ sec. reduction in the closing time of the press, it should be apparent to management that obsolete equipment not only reduces the productive capacity of a plant but is also a stumbling block to any plans the company may have to meet the competition which is now facing the plastics industry.

Injection molding field

Obsolescence in the injection molding section of our industry is not as great a problem as it is in the compression molding field. In 1941 there were 1000 injection machines with an average capacity of 6 ounces. Since that date 2500 new machines have been added. The capacity of these machines is such that when combined with the 1000 older machines which averaged 6 oz., the over-all average capacity is about 10 ounces. It is safe to say that the 2500 machines produced since 1941 can all operate efficiently and produce plastic parts competitively.

It is well known that many of the 1000 presses in operation in 1941 (and probably still operating today) had weaknesses of one kind or another. The speed of mold closing and injection were slow as compared to the machines being produced today. The downtime due to mechanical difficulties is quite considerable and for this reason management should make a careful study of these older units in order to be sure that they are not a liability due to their extremely high maintenance and operational cost.

As far as extrusion is concerned, the picture is about the same as in injection, although some of the newly designed units, compared size for size to the older ones, have been found to produce many more pounds per hour of extruded stock.

A planned layout

New equipment and new methods of production are just part of the answer to more efficient plastics processing. Another part of the answer depends on how the equipment, both old and new, is laid out. Too many molding plants have simply grown, expanding with little regard for efficiency.

Recognition of the importance of properly arranged equipment is to be found in the entirely new plants that some molders have recently put up. A case in point is the recent expansion of the Auburn Button Works. This company took over a new building and completely rebuilt the interior to include in its straight line layout the latest thinking in terms of mass production efficiency. Liberal use was made of bus ducts, fluorescent light trolleys, compressed air outlets and exhaust ducts so that straight line finishing setups would be possible. For this reason, drill presses, benches, broaches, buffs, etc., may be quickly installed in proper operational sequence and removed upon completion of the particular job they have been set up to finish. By this arrangement the company has been able to reduce handling and finishing bottlenecks and to achieve an operational flexibility which not only lowers costs but permits production of top quality merchandise.

Special drying room

In the molding department all high pressure pipes, electrical conduits and compressed air lines are engineered so that they come up through the floor, which is made of specially finished hardwood and very easy to keep clean. Management also set up a specially insulated room next to the material storage section. All molding compounds are placed in this room for two days before molding and are dried out by exposure to hot dry air. This procedure has resulted in superior quality in the molded parts and has permitted minimum molding cycles.

Pilot plant setup

Stromberg-Carlson Radio Corp. has recently installed pilot production machinery for the express purpose of eliminating molding problems from its newly designed parts. This laboratory is equipped with several compression, transfer and injection machines and a small laboratory-type extruder. Also included in these facilities is equipment which permits the testing of molded parts for their physical properties.

The supervisor of this pilot plant has the responsibility of eliminating all molding problems from the company's newly designed plastic parts. By conferring with the design department he makes sure that all new parts are designed according to the best practice of molded plastics and he gets the final drawing of the part before it goes to the purchasing department. A single cavity mold is then produced, sample production turned out in this mold being used to bring to light any molding problems that might develop and to correlate such molding data as mold temperature, cycle, possible shrink block requirements and other factors which normally must be discovered by the production molder. All of this valuable information is passed on to the molder with whom the job is placed. In the case of large parts, such as radio cabinets, the actual mold is delivered to the molder after it has been completely broken in and after all possible working problems have been eliminated.

This is a new departure in plastics buying and it would be well for all large users of plastics to investigate such a plan because it has every indication of being an extremely important and valuable development in the plastics industry.

Reaching the market you want with your plastic products

GIVEN a plastics product, or a product having plastics components, that is well designed, the next step after careful market analyses is to arrange for distribution.

After you have tabbed the big department stores, mail order houses, variety chains and general merchandising chains, there remains the whole broad field of small hardware stores, toy shops, furniture stores, electrical shops, appliance and radio stores, drug stores, dime stores, novelty shops, stationery stores, apparel and specialty shops, shoe stores and even groceries. In these small store fields, there are again chain groups.

Department store buying

It may be accepted that the foundation sales in mass markets will be made through the department stores, mail order houses, variety chains and general merchandising chains. A company entering the market with its own brand of plastics products will do well to contact the quality control or product standards departments of these organizations before preparing any advertising, label or package copy, and, before finalizing design.

The department stores have their own buyers in large cities such as New York and Chicago. But there are also, in both these cities, buying offices which are either independent organizations serving department stores scattered throughout the country or subsidiary purchasing organizations for chains or groups of department stores. Each of these buying offices maintains a full staff of buyers for each department and sells the products to the stores by means of bulletins, samples and pictures. It can be seen how important informative copy, packaging and sales material are in this business. Nine of the biggest buying offices are as follows:

Felix Lilienthal & Co., Inc., 33 West 34th St., New York
Kirby Block & Co., 128 W. 31st St., New York
Wm. T. Knott Co., Inc., 128 W. 31st St., New York
Allied Stores Corp., 1440 B'way, New York
Cavendish Trading Corp., 1412 B'way, New York
Irving C. Krewson Corp., 225 W. 34th St., New York
Associated Merchandising Corp., 1440 B'way, New York
National Department Stores, 112 W. 38th St., New York
Chas. Weill, Inc., 101 W. 31st St., New York

Mail order houses

Three of the biggest mail order houses with their total February sales are: Sears Roebuck & Co., $114,595,199; Montgomery Ward & Co., $71,205,237; Spiegel, Inc., $8,843,498.

These companies all maintain a heavy team of departmental buyers and have their own staff of standards experts whose work is supplemented by independent testing laboratories. These people sell by picture and written word in catalogs, as well as through their stores, so all information provided by a manufacturer must be truthful, concise and helpful in writing sales copy.

Variety chains and merchandise houses

The seven biggest variety chains with their February sales are: F. W. Woolworth & Co., $37,053,788; S. S. Kresge & Co., $16,394,150; W. T. Grant Co., $11,439,409; S. H. Kress & Co., $10,635,328; G. C. Murphy Co., $6,769,296; J. J. Newberry Co., $7,701,711; H. L. Green Co., Inc., $5,168,854.

All of these have their own staff buying specialists, and use outside product testing laboratories. Their approach is likely to be based on quantity costs plus staple and impulse merchandising needs. Sell one central buyer in each department and you get an order covering from 60 to 1200 stores.

Three big chain merchandise houses, again with their

TOTAL NUMBER OF OPERATING BUSINESS FIRMS		
	1939	1946
WHOLESALE TRADE	144,800	159,900
ALL RETAIL TRADE	1,601,400	1,616,800
GENERAL MERCHANDISE	74,500	63,600
AUTO PARTS AND ACCESSORIES	15,100	21,700
APPAREL ACCESSORIES, SHOES	86,100	85,400
HOME FURNISHINGS	29,500	39,500
APPLIANCES AND RADIOS	15,000	18,400
DRUG STORES	52,200	52,700
HARDWARE AND IMPLEMENTS	37,900	45,700

February sales indicated, are: J. C. Penney Co., $41,443,083; Mercantile Stores, $7,028,200; Interstate Department Stores, $3,117,535. They are sold in much the same way as are the variety chains.

Small stores as outlets

A total of 271,500 retail stores closed during the war and 286,900 new stores opened between V-J day and June 1946. While the total number of outlets is approximately the same as at the high prewar level, there has been a rising rate in the number of firms going into durable goods lines such as appliances, furniture, car accessories and hardware.

Each of these fields of merchandising has its own buying habits, special goods handling methods, delivery habits, display methods and type of sales promotion. A manufacturer of plastics products can concentrate on one field or can market through a variety of outlets. But he must know the habits of the channels he wishes to use to sell successfully.

In the drug field, for instance, there are several chains embracing 3600 units that may be sold at quantity discounts. There are also more than 300 full-line wholesalers who do 70 to 80 percent of the business done with the 48,000 independent retail drug stores. The retail price less 40 percent off for retailers less 20 to 25 percent off for wholesalers. The drug field offers to plastics products exceptional opportunity at present, because druggists are now liquidating inventory of "war substitute" lines of cosmetics, novelties, toys and toilet goods items, and are looking for good value in new sundries.

Furnishings, giftware, houseware

In the home furnishings field, where many vinyl products are marketed, the mail order houses do about 10 percent of the business, the department stores 30 percent, and small furniture stores 60 percent. New merchandise in this field almost always starts in the department stores which have promotion facilities to push it. Later, the new lines flow to other outlets.

In the giftware field, the national distributors are the important people to be sold because wholesalers and jobbers are not important in china, glass and giftware. There are about 200 important national distributors who are centered around 200 and 225 Fifth Avenue, 1140 and 1107 Broadway, New York and in the Merchandise Mart in Chicago.

The hardware field, including housewares, operates through the big merchandising outlets either direct with quantity discount or through wholesalers. The 30,000 independent hardware stores are all serviced through 510 wholesalers or jobbers. Here new plastics products have an advantage because of the good record of their past applications in hardware and home appliances. Furthermore they add color to displays.

Two distribution factors to watch

Two major factors in the present economics of distribution are worthy of note. First, wholesale stock of most types of goods are increasing at a much faster rate than sales. Comparing January 1947 with January 1946, wholesalers' sales of electrical goods increased 87 percent while inventory increased 170 percent; sales of house furnishings increased 53 percent while inventory went up 77 percent; sales of dry goods went up 24 percent while inventory increased 75 percent. While dollar sales are up, unit sales in many lines are down.

The second factor is the planned return by department stores, after present liquidation of poor quality stocks, to a 10-week inventory basis with a 4-week stock replacement.

RETAILING BOOKS FOR PLASTICS MERCHANDISERS:[a]

Buying for Retail Stores, by Norris Brisco and John Wingate (Prentice Hall, Inc.).

Elements of Retail Merchandising, by Norris Brisco and John Wingate (Prentice Hall, Inc.).

How to Sell in Chain Stores, by Fred S. Barton (Harper & Brothers).

Retail Advertising and Sales Promotion, by Edwards and Howard (Prentice Hall, Inc.).

Mathematics of Merchandising, by Egmore (University of Pittsburgh Press).

Retail Training in Principle and Practice, by Helene Lester (Harper & Brothers)

What Makes People Buy, by Donald Laird (McGraw Hill Book Co., Inc.).

Establishing and Operating a Variety and General Merchandise Store, by Miller (Bureau of Foreign and Domestic Commerce).

Elements of Retail Selling, by Paul H. Nystrom (Ronald Press Co.).

The Chain Store Tells Its Story, by John Nichols (Institute of Distribution).

Retail Merchandise Control, by John Wingate (Prentice Hall, Inc.).

[a] This list of books was picked from the library of W. T. Grant Co. by one of its top executives.

Acknowledgments

The Editors wish to thank the following for assistance and advice in the preparation of this article: Allen Newcomb, secretary, The National Wholesale Druggists' Association; Marshall F. Chapman, vice-president, A. C. Neilsen Co.; Leonard Rowlands, sales manager, *Hardware Age;* David Woog, director of merchandising research, National Retail Dry Goods Association; C. Frederick Hansen, director of research and planning, W. T. Grant Co.; The Bureau of Foreign and Domestic Commerce; The Association of Buying Offices, New York City.

1—In the merchandising of this plastic caster, the manufacturer uses different packaging and display equipment for the hardware field than for the self-service outlets

Your selling plans must be keyed

AS WAS pointed out in our article on market channels, plastics products and products with plastics components sell through a wider variety of outlets than products made from any other materials. Frequently the same product will sell in two or three different types of outlets, each of which will require its own type of display, packaging, labeling and also advertising material.

Selling two hardware items

A good example of this is the case of the Levelor adjustable furniture slides, produced by a subsidiary of Reed Plastics Corp. of New York City (Fig. 1). For the hardware trade, the company produces a setup folding box (shown left in Fig. 1) which holds six cardboard packages. Each package contains a small instruction folder. The dealer receives the slip shown at front with the price sticker and an offer of additional sales helps. For the dime store and variety chain outlets, radio shops and auto supply stores, the company produces "impulse" packages plus a small colorful display card designed to stop people in fast-moving store traffic and quickly make a sale with no need for extra help from a sales person.

Another example of a sound merchandising approach is the method used to sell Resinite vinyl hose, made by Resin Industries, Santa Barbara, Calif., through neighborhood hardware stores, nurseries, feed and seed stores. Here, regardless of the fact that these outlets are normally serviced through wholesale houses, it was felt that a specialized type of selling was necessary to introduce a product produced from new materials with which neither wholesaler, retailer, nor consumer was familiar. The hose was put on the market at a price considerably higher than prewar rubber hose. This price was justified by the quality of the material and the years of experience and know-how that went into its fabrication.

Resin Industries used factory representatives to conduct an educational and sales campaign directly with the retail dealers. The established wholesale houses were advised of the company's plans to distribute through them as soon as sufficient trade and consumer acceptance had been built up. This method produced much better results than could have been done through the wholesale hardware salesman with sales catalogs containing thousands of items.

Figure 2 shows the display stand with the hose in different colors coiled in front of it, a folder used to introduce the product and a large strong green informative tag. Even the paper cord used to tie the hose in a coil and to apply the tag carries the company's advertising. On the hose itself is a vinyl trade name decalcomania. Note also that the company guarantees

satisfaction or the dealer will refund the customer's money.

Different packages for different outlets

A different approach to the problem of merchandising through a variety of outlets is used by the Mastro Plastic Corp. for its clothespins. The same pin is sold in hardware stores, infant's wear shops and variety chains. The hardware stores offer pins in strong colors while baby's wear shops offer pastel shades; and the variety chains offer a wider variety of colors prepackaged for quick sale. The packages and display material for each type of outlet are entirely different in their appeal.

Sales helps important

The "Pump It," a polystyrene plastic pump with a spring made of stainless steel and a neoprene plug, is designed to fit snugly into a standard size ketchup bottle. The product retails at a dollar everywhere—but five forms of packaging are available: 1) mounted

to your outlets

2—Sales equipment for a vinyl garden hose—literature, informative label and display stand—all carry firm name and vital product information

on a card; 2) a plain box containing 12 units; 3) a printed display box containing a dozen units; 4) a plain individual box; 5) a printed individual box. Advertising is directed exclusively to the retailer and printed explanation sheets for additional use in display as well as in selling.

Ayvad Water Wings will sell in sporting goods stores, department and chain stores and drug stores. This company uses the same material for all outlets, depending on a potent package with informative copy and a well designed consumer booklet to do the selling job (seen in Fig. 3).

A variety of promotion means are used by the manufacturers of plastics hangers in offering their products to the variety stores, department stores, hardware stores, apparel shops and furniture stores. Three main principles are usually followed: 1) a thorough explanation of the product, its design and its qualities; 2) a presentation of the packages offered; 3) suggestions for retail display and, in some cases, a special offer of a standard display fixture. One line also carries the maker's guarantee.

Hall Products Co., who manufacture a branded line of molded nylon tap washers as well as other specialties, are now introducing the "Rula-Needle," a pair of cellulose acetate knitting needles one of which has a 12-in. ruler printed on it. Each pair of needles is attached

3—Attractive packages containing labels, well illustrated folders and promotion sheets are used in the merchandising of these vinyl water wings

4—(Above) Purely an impulse item, these ruled knitting needles, in five sizes, are placed on a display card, readily available for sale

5—This plastic pencil sharpener display provides for restocking by having a supply of merchandise at rear of card

both front and back so that as sharpeners are removed from the front, the card may be filled up by taking from the back. The unit is designed in such a way that it may be used for display and sales value in a window, on a door or on a wall.

Figure 6 shows how to merchandise multiples from the same mold by putting four pieces in one brilliant display package and selling the whole thing as a unit. This is accomplished by Vlechek Tool Co., Cleveland, Ohio. Behind the package is seen one of the dealer mailing pieces of this company.

Strong selling of vinyls

Some interesting merchandising is being done in the field of sheet vinyl materials. Krene material, made by National Carbon Co., Inc., New York City, is offered in ensemble-matched pieces, the plastic articles and trimmings being supplied and sold under a color coordination plan. Velveray Corp., also of New York City, has a special booklet in non-technical language for store personnel entitled "The Story of Plastic Film." The company turns out a regular monthly bulletin written and directed to buyers in retail organizations. Protex Products Co., Jersey City, N. J., provides a complete pattern service for firms who buy Quiltron quilted vinyl material, with suggestions and instructions for bedroom and nursery decoration. This company also provides bulletins for retail merchandisers. A St. Louis department store recently established special sewing classes for customers, under the auspices of Roth Fabrics, manufacturers of Alrolite vinyl film. Pat-

to a long package card and five of these cards with different sizes of needles are attached to a display easel. It is strictly an impulse item. A bulletin to the dealer describes the merchandise, gives the size, the suggested retail price, the dealer's price, the terms, the packages and also includes the promotion material offered by the company (Fig. 4).

Selling a dime item

The plastic pencil sharpener (Fig. 5), made by Sterling Plastics Co. of Union, N. J., is offered in a number of different types of outlets by means of a single cleverly designed display and sales unit. On a 10¢ item a manufacturer cannot afford fancy packaging and multiplicity of informative or display material. So the company used a merchandise display unit with stock on

terns and instruction leaflets were made available and preparatory lectures were given to the sales clerks by a decorating authority so that its characteristics and many applications could be made directly available to the purchaser through these clerks.

Material manufacturers promotion

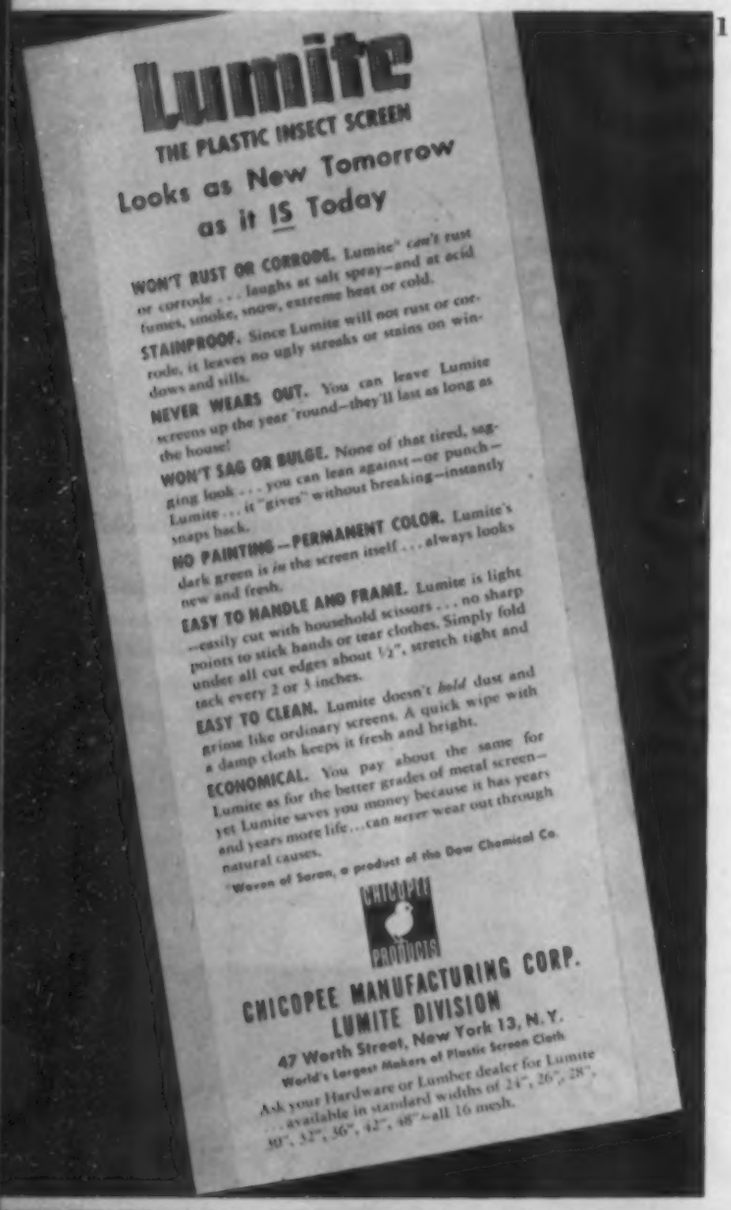
A standard practice of companies manufacturing new lines of products in introducing them to department stores, mail order houses and variety chains, is to contact the merchandising manager of the stores, sending them paper description sheets on each item, and sometimes samples so that these may be mailed to the buyers concerned. Monsanto Chemical Co., in an effort to help its molders, are distributing the "Plastics Merchandiser" to department and chain stores. This promotion piece is an envelope folder in which are placed illustrated sheets describing the merchandise. It is illustrated in Fig. 7. Celanese Plastics Corp. supports with various types of buyer promotion those who use its cellulose acetate sheet material in the extensive manufacturing of lampshades.

Of vital interest to the merchandisers of plastics is "A Recent Analysis of Publicity Expenses in Retail Stores" published by the National Retail Dry Goods Association. This survey shows that there is a decline in the percentage of the publicity dollar spent by stores for newspaper advertising and an increase in the percentage spent on display. Manufacturers can take advantage of this situation.

6—(Left) An example of how to sell multiple items of the same mold is illustrated by this display package. Barrels of the four kitchen shakers are the same; heads are different. As a set, they sell readily

7—(Right) One materials supplier, in an effort to promotionally aid molders, furnishes department and chain stores with literature that describes the finished molded products

PLASTICS LABELING needs coordination



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WE ARE entering a buyer's market. In a buyer's market, comparison of price, quality and utility are the factors in making sales. The informative label is the means of presenting the facts for comparison. But those facts must be expressed in understandable terminology, must be based on accepted standards and, especially in the case of a wide variety of comparatively new materials such as plastics, must be accompanied by sufficient educational information to encourage quick recognition for repeat sales.

First, we need a simple terminology for reference. With 14 types of plastics available, some of them in an astronomic number of formulations and with such wide differences in qualities, it is no wonder that some of the better advertised trademark names are being accepted by public and retail trades as generic terms for all similar plastics.

Second, we need standard accelerated laboratory tests for proving suitability of applications. The products may be labeled "flame resistant," "abrasion resistant," "moisture resistant"—yet there are no standards whereby these qualities may be judged. A plasticized material may be practically dimensionally stable in one application and likely to warp in another—but the consumer doesn't know that. The National Bureau of Standards has set up the initial machinery to establish consumer standards for various plastics products, each application to have its own specifications according to the use or abuse to which the product may normally be put. The industry's official bodies are cooperating in committee on this long-term project.

Third, we need a more uniform approach to copy on labels. Some of them are fulsome in language; others are terse to the extent of not informing properly. Some are completely positive; others are full of don'ts which might lead the buyer to believe that the product has serious faults. At least for some time to come, the informative label will have to do more than sell. It will have to carry some of the burden of educating both retail salespeople and consumers about plastics and it will have to do some of the public relations work so keenly needed by the plastics industry.

Fourth, any program of informative labeling must be supported by a consumer and trade education campaign, through every avenue of public education.

A guide to labeling

In the label outline, presented at the top of the following page, is a list of facts which a good informative

A GOOD INFORMATIVE LABEL FOR PLASTICS SHOULD:

1. Tell what the product will do.
2. Tell what the product will not do.
3. Tell how it should be cared for.
4. Give trademark name or name of plastic.
5. Present test results and/or guarantees by maker.
6. Give the marker's name, address and trademark.

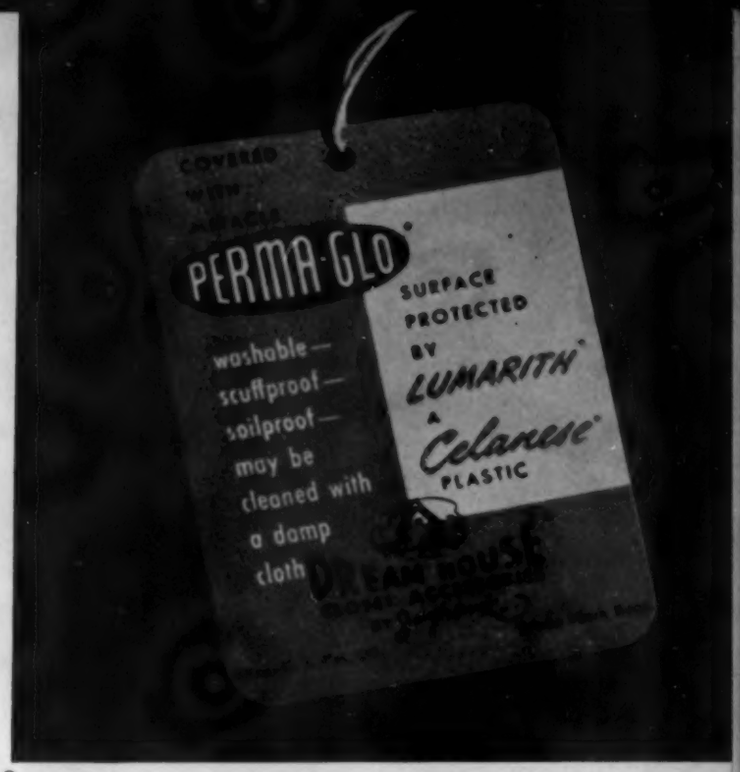
label on a plastics product should contain. On analysis it can be seen that the average plastics product or component can be thus labeled in a few words—providing the standards are generally recognized and the terminology is simple.

How far informative labeling of plastics products and products with plastics components has veered from the path of common sense in merchandising (a path pointed out by MODERN PLASTICS in October 1945) may be seen from a study of present labeling trends.

Labeling by material manufacturers

The increase in adoption of labeling started largely as an attempt at self-protection by some material manufacturers. It was part of their sales promotion program and was linked to national advertising. When Bakelite Corp. found that retail markets were being swamped with products made from improperly formulated or poorly fabricated vinyls, it embarked on its own informative labeling program in order to protect its trademark, Vinylite.

This trademark is available only to products made from sheet material coming from the company's vinyl plant. It is available only after the product has been passed for design by the material firm's engineers and



3

for utility in use by the Better Fabrics Testing Bureau, an independent testing organization. Figure 2 shows two sides of the Vinylite label used by Du Page Plastics Co. on a group of large inflated water or beach toys.

Celanese Plastics Corp. maintains a label design department, preparing layouts and copy for folders, stickers, tags, etc., on behalf of the fabricators of Lumarith sheet material. Designs for products, to be granted use of the labels, must be passed by the company's design and engineering department, and policing is maintained by providing only enough labels as there will be finished products from any single shipment of materials (Fig. 3).

Rohm and Haas Co., faced with a market full of poorly fabricated and badly designed acrylic pieces, generally made from scrap, decided to support with informative labeling approved fabricators who had worthwhile designs made out of Plexiglas. Figure 10 shows this label as applied to a Revell compact.

All suppliers of vinyl coverings to the furniture manufacturers developed their own labels. B. F. Goodrich Co. thus promoted the proper application of

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7 Koroseal, Firestone Rubber and Latex Products Co. did it for Velon; Dow Chemical Co. did it for Saran, (see Fig. 7). All were supported in some measure by national advertising.

Labels put out by processors

Growing out of this development came the trademark name labeling by molders and fabricators. Chicopee Manufacturing Corp.'s Lumite division, weaving Saran monofilament into insect screen, brought out its own
8 label with its own name (Fig. 1). There appeared at the same time a whole host of registered trademark names on labels used by processors. The Aeroflex label of Anchor Plastics Co. (Fig. 8), the Aeroware label of the Standard Products Co. (Fig. 4) and the Nestex label of Necessities Limited (Fig. 4) are examples.

Some companies, such as Kilgore Manufacturing Co. used the generic name of the plastic material (Fig. 9) along with their trademark names. Others used no name whatever, as in the case of the American Blower Corp. grille label in Fig. 6, or the Kem Card label in Fig. 5. The O'Sullivan Rubber Corp., entering the sheet vinyl field, labelled its products Pedigreed Plastics, and, foregoing any definitions (Fig. 4) simply guarantees its products to the consumer and counts on careful policing and intense instruction to fabricators to prevent misapplication.

9

Simplification needed in labels

Nearly every label illustrated here has certain excellent features. In some of them (Fig. 2, 4 and 6) a real effort has been made to provide specific facts. A few companies are submitting their products to independent testing laboratories for written approval on accelerated testing, and printing those facts on their labels. Some makers of proprietary items have applied the guarantee (see Resinite hose picture, page 103) with good results.

BUT—the whole situation has both retail trade and consumer completely confused. The multiplicity of trademark names, the lack of uniformity of type of information and kind of presentation of facts, the lack of any generally accepted standards or specifications for applications are serious shortcomings in the merchandising of products made from materials from which the consumer expects too much.

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Acknowledgments

The editors wish to thank the following persons for their kind cooperation in the preparation of this article. Alfred Auerback, merchandising consultant, former editor-in-chief of *Retailing Home Furnishings* and former head of the Consumer Durable Goods Branch of OPA; Harry Barth, assistant merchandising manager, W. T. Grant Co.; Ephraim Freedman, director, Macy's Bureau of Standards; R. S. Berson, vice-president and merchandising manager, National Department Stores Management and Buying Corp.; C. Levin, assistant merchandising manager, Felix Lilienthal and Co., Inc., as well as the plastics manufacturing companies that provided labels, packages and comments.

DR. JOHN J. GREBE

The 6th John Wesley Hyatt Award

Dr. John J. Grebe, director of the physical research laboratory of the Dow Chemical Company of Midland, Mich., received the John Wesley Hyatt Award for outstanding achievement in the plastics industry during 1946, at the annual award banquet held on April 23, at Hotel Statler, Detroit, Mich. At the same time Robert R. Dreisbach of the physical research laboratory staff of the Dow Chemical Co. was presented with a silver medal by the Hyatt Award Committee.

Dr. Grebe was cited for his work in the production of pure styrene and its polymerization, credited with making possible the wartime production of styrene for synthetic GR-S rubber, and a steadily increasing list of uses including, of course, plastics. Mr. Dreisbach received the silver medal in recognition of his contribution to the development of styrene. Charles F. Kettering, vice-president of General Motors Corporation and a member of the Hyatt Award committee, made the presentation to Dr. Grebe.

Walter Dorwin Teague, industrial designer, was the principal speaker at the dinner. Richard F. Bach, dean of education and extension, Metropolitan Museum of Art, New York City, was toastmaster.

The citation reads as follows: "Before World War II, Dr. Grebe had been seeking an improved electrical insulating material. As pure polymerized hydrocarbons are well adapted to this use, his work led him to styrene. Dr. Grebe and the men associated with him in the laboratory did much of the major research work in this country on the production and polymerization of styrene. The great effort which his laboratory devoted to the styrene monomer made possible to a large extent the wartime production of styrene for the synthetic, or GR-S, rubber needed in the war."

Following graduation from Case School of Applied Science in 1935 Dr. Grebe joined the research staff of Dow, where he has conducted research on electrochemical analysis and control, heat transfer fluids, thermal power cycles, electrolysis of fused salts, chemical treatment of oil wells and high temperature cracking processes for making unsaturates including butadiene, synthetic rubber and high-frequency electrical insulation.

Dr. Grebe won the Chemical Industry Medal in 1943 for his work in helping to solve some of the problems connected with the automatic control of chemical reactions.

Dr. Grebe is the sixth recipient of the John Wesley Hyatt Award, sponsored by Hercules Powder Company to honor Hyatt, the father of the plastics industry. The annual award comprises a gold medal and one thousand dollars.

POLYSTYRENE

POLYSTYRENE wall tiles represent a major application of plastics in the building trade. They introduce to the market a hardy, permanent wall covering which fits admirably into our modern architecture, not only from the standpoint of beauty, but of color and texture as well.

Why polystyrene for wall tile?

The physical properties of polystyrene were important in the choosing of the wall tile material. This plastic material has very low water absorption, excellent dimensional stability and good resistance to heat. Resistance to stain, abrasion and discoloration are other features of the material which are considered as essential in good wall tile.

It has been found that 150° F. is a maximum safe operating temperature for wall tile. Short time exposures to higher temperatures often are not particularly harmful because conditions of equilibrium are slow to obtain and the wall heats through long before the plastic does.

The tensile strength of polystyrene wall tile varies from 3000 to 10,000 p.s.i. depending upon the location

° The material from which this article was prepared was supplied by the Dow Chemical Co., and the polystyrene tiles discussed are molded of Styron.

PHOTOS AND DIAGRAMS, COURTESY DOW CHEMICAL CO.

Above—A wide market is anticipated for injection molded polystyrene wall tiles for private home use. They are easy to take care of and may be installed without any special wall construction or treatment by the architect

Right—About 40 percent of the polystyrene wall tile production is expected to go into kitchens. The fact that tiles are available in colors has encouraged their use in homes

WALL TILE*

These colorful injection molded tiles should find acceptance in institutions and in business as well as in the home

of the sample cut from the tile and the conditions of the molding. The tensile strength, compressive strength and flexural strength of the material are adequate to permit ordinary handling both prior to installation and in installation. Once the tiles are installed, tensile strength requirements are only that which will support the tile itself. Impact strength varies throughout the part and, like the tensile strength, has proved adequate for all ordinary handling and use.

Wide color range

The wide range of color in which polystyrene is available is another important reason for its selection for this new application. Depth of color of these tiles, which eliminates the sameness seen in other tiles where color is "on top" so to speak, can best be explained by the diagram that is shown on page 112. The dots represent color pigments which are distributed throughout the tile. When the light strikes a color pigment within the tile it does not strike a single plane on the surface but travels into the tile, striking an infinite number of planes within the tile. Thus, when the light is reflected back to the eye, there is an impression of depth which is pleasing.

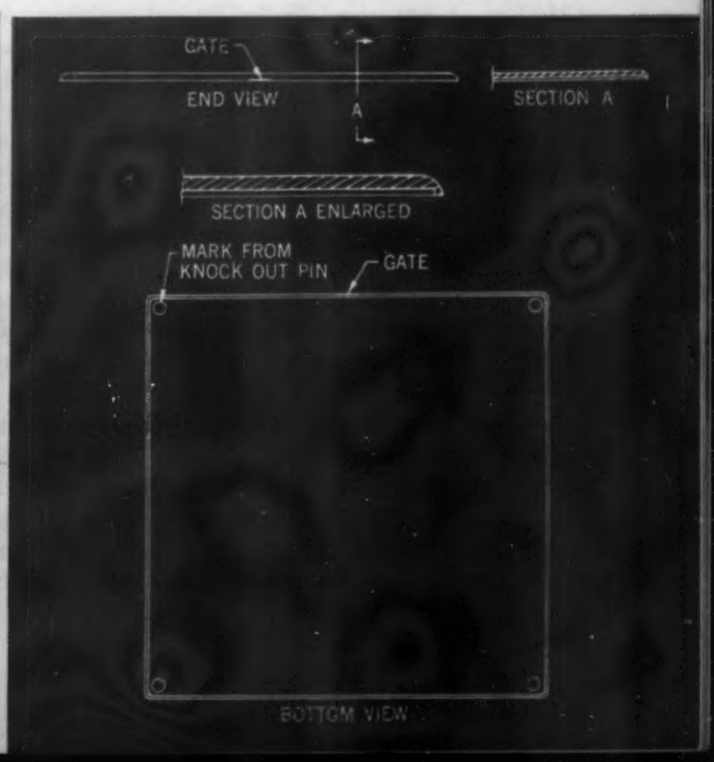
On the basis of reports from all of the plastic wall tile manufacturers and dealers contacted, color preference in plastic tile seems to run in the following order: marbelized type—peach, dubonnet, yellow, green and blue. Solid white and ivory have had some demand and iridescent wine is a good seller. Black, white, ivory and dubonnet have been used for trim with black being the most popular. Tiles of variegated pastels called rainbow green, rainbow pink and tiles in many pastel shades which work in well with trims of black and white are also available.

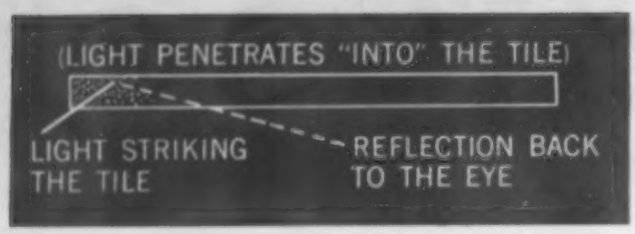
Markets for the tiles

There are many and varied uses for these wall tiles. In homes the tiles are most frequently used in kitchens and bathrooms, but they are also suitable in breakfast nooks, dinettes, entrance ways, foyers, stairways to basements and recreation rooms. It is anticipated that hospitals, clinics, restaurants, lobbies, reception rooms, hotel bathrooms, gas filling station rest rooms, theaters and night clubs will make use of them as the supply increases. Their prime importance, however, is expected to be in the private dwelling. To date, approximately 60 percent of the installations have been in the bath-

Polystyrene wall tiles keep their luster in normal usage but if extra gloss is desired they may be highly polished with a water emulsion wax. Because color penetrates completely through the tiles, a surface scratch does not show up as it does on tiles that are only surface coated

Polystyrene tiles should be molded to a thickness of not less than 0.060 inch. The location of knock-out pins is very important since they help eject the tile, help eliminate breakage at gate and prevent warping, which is most likely to occur when molding cycles are speeded





Depth of color apparent in these tiles is due to the light traveling into tile on an infinite number of planes rather than being reflected back from a single surface

rooms and 40 percent of the installations have been in the kitchens of small homes.

Size of the tile

The polystyrene wall tile is about 0.060 in. thick except for bevel edge which is about 1/8 in. thick (see diagram on page 111). Weight runs to about 6 oz. per sq. ft. which is equivalent to approximately 3/4 oz. for a single tile. A popular size for the field tile is 4 1/4 by 4 1/4 inches. Trim tiles half the size of the field tile (2 1/8 by 4 1/4 in.) are also available as are some larger sizes of basic field tiles.

Installation

The polystyrene wall tiles do not require specially constructed walls for installation. They may be applied to plaster, wood, stone and plywood. Of course, the walls must be true to insure a satisfactory installation. If they are not, or if there are holes and cracks, the surface should be plastered over until it is smooth and square. Emphasis should be placed on the word *smooth* since a rough plastered wall is an extremely poor base for the tile. Sealing the wall with orange shellac is a precautionary measure necessary when some mastics are used in order to prevent bleeding of the oil in the mastic. If a wall has been covered with wall paper or oil cloth this must be removed and the paste washed off before tiling is done.

Mastics—A linseed oil (boiled linseed preferred) and white lead putty-type mastic, whitened with titanium dioxide is being used extensively for the installation of these tiles. It hardens at the tile edges within 10 to 18 days and remains soft under the tiles for an indefinite period of time. Another type of mastic currently in use is a rubber latex mastic. From examinations to date, this mastic appears to have even more tile holding adhesion than the linseed oil type.

Trimming tile—Tile (to fit corners and edges) should not be cut with scissors or tinsnips since this cutting action results in hair line cracks and craze marks into which the mastic can seep to cause discoloration. A special type of shearing tool, similar to the type of cutter used to trim hard asphalt shingles, is supplied by some tile distributors. When straight line cuts are not feasible and curves or holes are necessary for bath tub valve stems, etc., a coping saw should be used. While this saw-cut edge has a satisfactory resistance to linseed oil type mastic, it has not, however, been checked with rubber latex mastics.

Care and maintenance

Abrasive cleaners must not be used to clean polystyrene wall tile because they will scratch the surface severely. If dust collects, it may be easily and quickly removed with soapy water or a soapless cleaner. Soap will not harm the tile itself but there is a possibility that very strong soaps may saponify the linseed oil type mastic and continued washings over a long period of time may wear away the mastic. The plastic tile should not be cleaned with gasoline or dry cleaning agents. Carbon tetrachloride should not be used. Such materials will etch the tile and cause the surface to be dulled or pitted.

The tile should be waxed, preferably with a water emulsion wax which does not contain turpentine, as do many paste waxes. A treatment of this sort has been found in some cases to prevent the adherence of dust particles to the tile. Tiles should not be polished until mastic is set, about eight days after installation.

Molding the tiles

The tiles are injection molded, the wall thickness being no less than 0.060 inch. If the tile is too thin, molding difficulties may be introduced and translucent colors may allow mastic troweling lines to show. The proper location of knock-out pins is of considerable help in the ejection of the part, in the prevention of warping (which may allow faster molding cycles) and in the elimination breakage at the gate due to pulling of the piece from the mold.

A typical molding production cycle for a four-cavity mold is as follows: size of shot, 4 oz.; total cycle, 50 sec.; plunger forward, 20 sec.; clamping time, 30 sec.; molding temperature, 400 to 425° F.; injection pressure, 20,000 p.s.i.

Runners should be cut from the tile rather than broken and they should be cut as soon after ejection from the mold as possible. Tiles, after trimming, should be stacked so that each uniformly supports the one above. Slip-sheeting is recommended.

Distribution

The tiles are sold through regular tile dealers, and manufacturers report that some of the large merchandising marts are considering plans to sell them directly to the consumer. At present there are 26 molders of this tile and 15 or more distributors.

Conclusion

The Dow Chemical Co. has participated in the plastic wall tile project and has contributed a considerable amount of developmental and research work. A spokesman for Dow recently said that the success of the product depends almost entirely upon proper application. Careless installation of polystyrene wall tile can spell failure of a product destined to play an important part in the American home construction field.

1—(*Left*) *Typical of the vinyl covers that can be made for various uses, is this fishing equipment case that has several compartments and a handle. Case has been vented to permit wet equipment to dry after insertion*

2—(*Right*) *Axe sheath is made from 0.040-in. thick vinyl on bar-type welding machinery. A strip of ridged vinyl has been welded on the inside, at the back end, to give the cover a three dimensional effect and allow it to fit the contours of the axe head*

PHOTOS, COURTESY WESTCOX PLASTICS CO.

Vinyl covers afford maximum protection

WOMEN have long been familiar with the advantages of vinyl sheeting as covering material—for dresses, hats, lingerie, kitchen appliances, food. Now men are going to discover the benefits of vinyl in this type application, but here the objects to be covered are axe heads, fishing rods, laboratory equipment.

Two examples of these Vinylite covers being fabricated by Westcox Plastics Co. of Buffalo, N. Y., are shown in the above illustrations. Not shown are the laboratory equipment covers and the variations that have been worked out for covers of various fishing rods.

An axe sheath

The axe sheath shown in Fig. 2 is fabricated from 0.040-in. thick Vinylite, formulation VU-1930, for Fayette R. Plumb, Inc. The most interesting feature of this cover is the means the fabricator has used to achieve three dimensions. A strip of rigid vinyl is welded to the inside of the sheath in a position corresponding to the wide section of the back of the axe. A number of slits have been cut in the sides to permit the escape of moisture clinging to the axe when it is put away. The axe sheath is fabricated entirely on bar-type welding equipment. On some of the company's other products, electronic continuous seaming equipment is used.

Fishing case

The cover in Fig. 1 is fabricated from a 0.020-in. thick Vinylite, formulation VU-1930, for Richard T. Makie. Other covers are being made of 0.004-in. thick vinyl. To permit rods to dry after insertion in the case the fabricator vents these rod covers in a number of places, just as he slits the axe sheath.

Other vinyl covers

As mentioned earlier, Westcox Plastics Co. also fabricates covers for laboratory equipment. The company is also making sheaths for manicure files for the Delta File Works. Other activities include the fabricating of gaskets, ducts, sleeves, etc., from vinyl film and sheeting for certain types of industrial equipment.

Acrylics improve

Resistance to steam used in cleaning, non-toxicity, transparency, light weight, explain use of acrylic in salter housing

THERE can be no compromise in food handling. Particularly in commercial processing, both the food and the equipment used in its preparation must meet rigid standards of cleanliness, non-toxicity and resistance to breakage.

A calcium chloride dispenser

It was these standards that were, in large part, responsible for the selection of acrylic for the housing of a salt or calcium chloride dispensing machine developed by the Salter Machine Co. in cooperation with the K-Plastix Co., of San Francisco, Calif., for use

NEW SALTER

1—*High heat-resistant acrylic is used for the three assemblies that make up the body of the industrial salter housing above. Assemblies are the dome, the hopper and cylinder, and the skirt. The machine is used to add loose calcium chloride directly to each can of tomatoes as it is processed*

OLD SALTER

2—*This early machine, used by canners of vegetables, fish, tomato juice and other products for the addition of sodium chloride directly to the cans, contained no plastics*

performance of industrial salter unit

in the commercial canning of tomatoes. Present plans are to distribute the machine through a number of salt companies.

Purified anhydrous calcium chloride in small carefully controlled amounts has, in recent years, come into wide use in the canning of tomatoes. It is used under the Food and Drug Act regulation as a cell strengthener to prevent softening of the tomato from the combined effects of processing heat, handling in shipment and the softening action of sodium chloride or common table salt. It was always considered preferable to use the calcium chloride in loose form, but for a long time this was not considered feasible because of its hygroscopic property. Now this is changed. With the new dispenser, having an acrylic four-part housing, loose calcium chloride can be added directly to each can of tomatoes as it is processed.

3—This experimental industrial salter unit represents a half-way mark between the first machine shown in Fig. 2 and present model (Fig. 1) which uses acrylic

Acrylics were found to have advantages other than cleanliness, non-toxicity and resistance to breakage that made their selection for this particular application advisable.

1. *Transparency*—The clarity of the material affords the operating personnel constant visibility of the material supply and of the operating mechanism.
2. *Light weight*—Being light in weight the housing is easy to remove when the calcium chloride supply needs replenishing or when the mechanical parts require servicing.
3. *Non-corrosive*—Like acrylic's non-toxic qualities, the non-corrosive properties of this material eliminate danger of the calcium chloride contaminating the tomatoes.

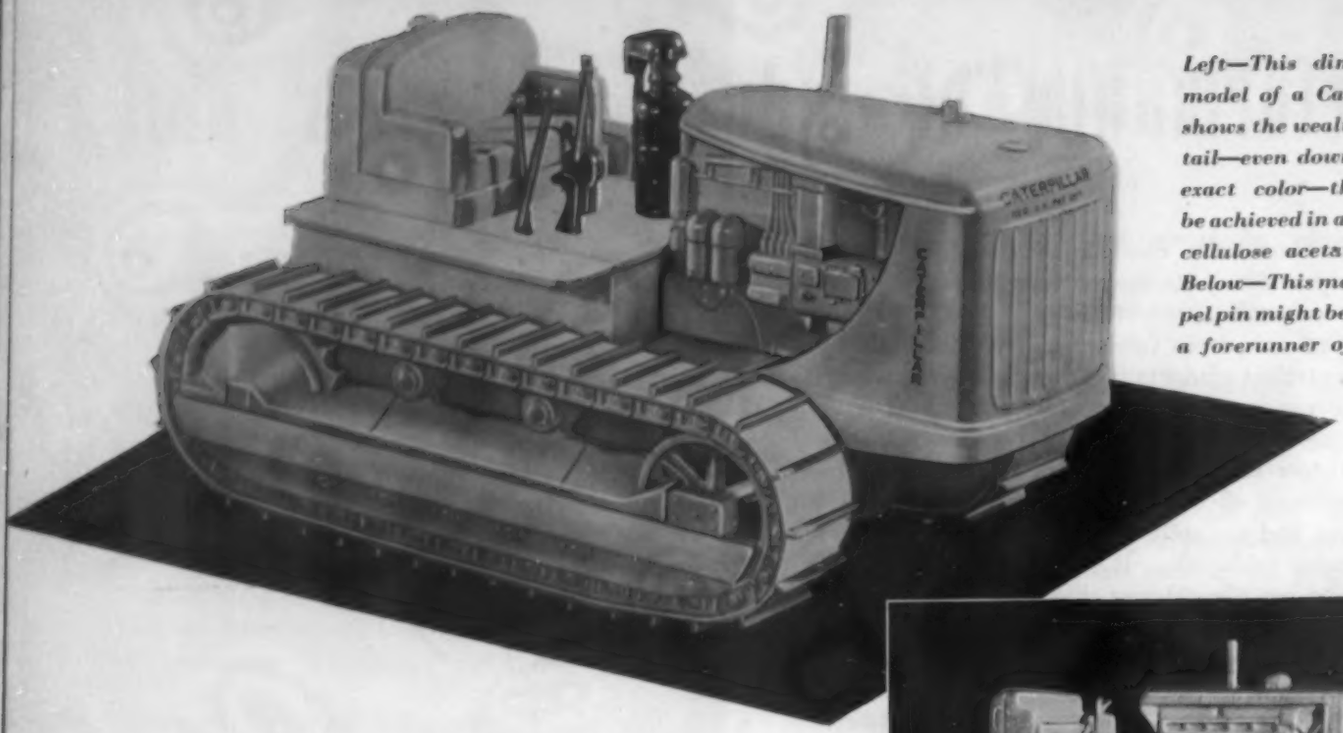
In view of the necessity for the acrylic housing to withstand steam cleaning and internal drying heat without distortion, Plexiglas Type II was the acrylic formulation finally selected for this work.

The fabrication of the three acrylic assemblies comprising the housing of this industrial salt dispenser presented the fabricator with a number of problems. There was, for example, the question of how the odd-shaped hopper could be drawn and how the double curvatures on the small half-dome could be formed. A special cementing technique had to be worked out in order to bring the resistance of the cemented joints up to the strength of the acrylic material itself. Another poser was the method to use in fastening the plastic parts to the metal housing framework so that seal would not be affected by varying heat conditions.

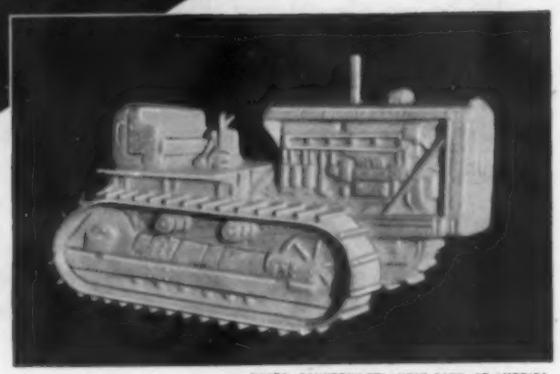
Added to all this was the need for easy assembly—a "must" in this particular unit. As finally worked out by the fabricator, a "turn of the wrist" is all that is required to attach or detach the acrylic cylinder and hopper assembly. The skirt can be slipped from the cylinder with a slight pull. The loosening of four screws permits removal of the dome assembly. In fact, after the metal base is fastened to the working base with wing nuts, the whole machine can be assembled in six minutes, without recourse to special tools.

Development work

The new salter with its acrylic housing is the outcome of several years developmental work and is a refinement of a metal and glass dispenser formerly marketed by the Salter Machine Co. (Fig. 2) and an experimental model (Fig. 3). This experimental model, which first made use of plastics in this type application, had a Plexiglas enclosure and hopper. It was given extensive tests on the production lines of a number of tomato canneries, thus laying the foundation for the present dispenser.



Left—This diminutive model of a Caterpillar shows the wealth of detail—even down to the exact color—that can be achieved in a molded cellulose acetate piece Below—This molded lapel pin might be termed a forerunner of model



PHOTO, COURTESY CELANESE CORP. OF AMERICA

Plastic models promote product and services

WITH the resurgence of business competition, many leading companies are utilizing miniatures to promote acceptance of their products or services. This growing interest in models as a merchandising tool has sent volume requirements skyrocketing. Handmade replicas are far too slow and expensive to produce to compete in a volume market. Metal castings can be used but they entail considerable finishing work if fine details are to be attained and present a coloring problem. In addition, there is the shipping weight to consider in models of any size. The solution of these volume requirements has, in many instances, rested on the choice of plastics as the medium from which to make the miniatures.

One look at the Model D-7 Caterpillar tractor made for Caterpillar Tractor Co. by Cruver Mfg. Co., Chicago, Ill., will indicate why molded plastic is a natural for applications of this kind. As may be seen in accompanying illustrations, this miniature is strikingly complete, even down to such details as motor parts, radiator shell, hitching drawbar and bolt heads. Even the diminutive control levers faithfully duplicate the full-sized machine from which they were scaled.

Prior to the war, Caterpillar Tractor Co. had a large number of salesmen's lapel badges molded by Cruver in the shape of a tractor silhouette. The pins, measuring about $2\frac{1}{2}$ in. long, were so designed that the shallow oval formed by the treads would hold the name of the badge wearer on a typewritten slip of paper.

After the war, Caterpillar became interested in obtaining an accurate model of its popular D-7 diesel tractor for distribution to customers through its dealer organization. Since Cruver had been a major supplier of recognition boat and aircraft models during the war period, and was well equipped to handle all necessary operations, this firm obtained a set of original blueprints of the full-sized machine and went to work.

A scale model

The first step involved the preparation of special 1:24 drawings from the original plans supplied by Caterpillar, since it was desired that 1 in. on the completed model would represent 2 ft. on the actual tractor. After the scaling-down process, a hand made model was made on which all details of construction could be studied to develop the most practical molding and as-

sembly methods. Only following completion of this preliminary study was actual die work started.

Engineering considerations pointed to the wisdom of making two dies—one for the heavier parts, such as the treads and frame, and the other for the smaller components, ranging in size down to the tiny control pedals, throttle and other control levers. All intricate die engraving on the molds, which contributes the wealth of detail in the finished model, was handled exclusively by the molder.

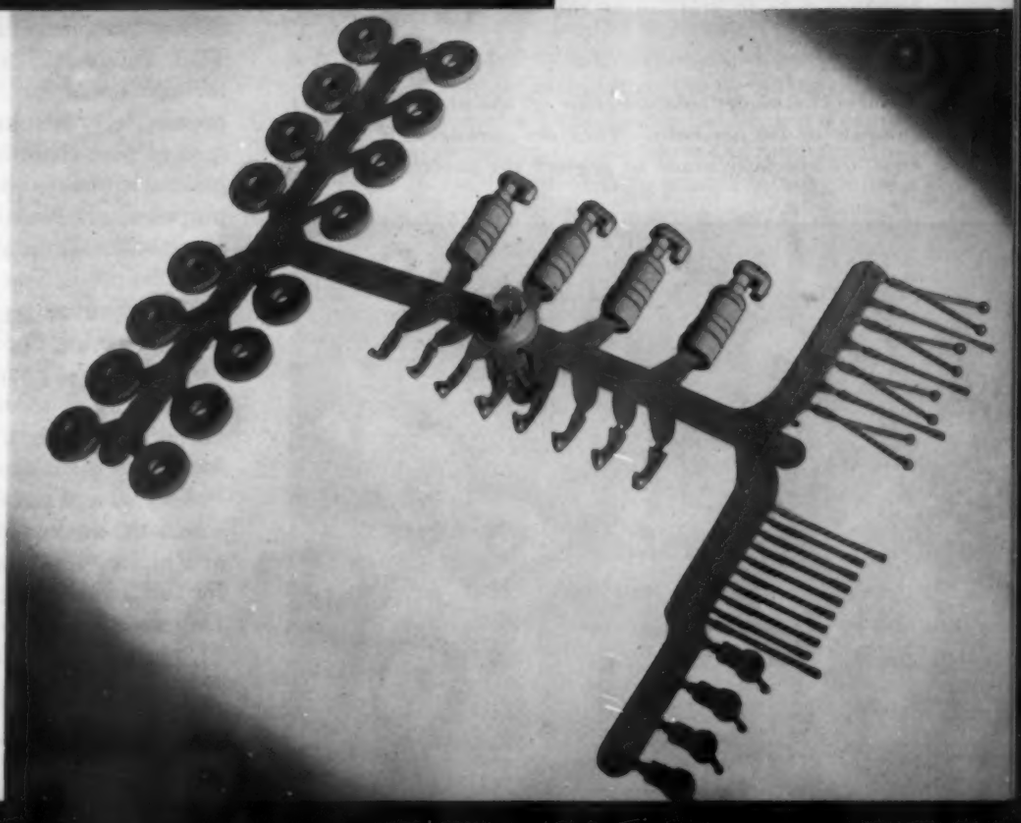
The finished Caterpillar model is injection molded in highway yellow Lumarith and Nixon cellulose acetate, accurately duplicating the color long identified with the big Caterpillars. The assembly includes 19 individual molded parts and four decals and weighs approximately 6 ounces. Overall dimensions of the model are: length, 7 in., width; $3^{7}/_{8}$ in. and maximum height, 4 inches.

Assembly and finishing

Parts for the model are degated and fed to a conveyorized assembly line from which the finished units emerge boxed for shipment, at a rate of 150 per hour. This speed of production is made possible by the fact that all sub-assembly and assembly operations are closely integrated, with unproductive labor cut to a minimum. Another point that makes for rapid assembly is the design of all parts so that they will snap firmly together. However, all joints are acetoned together to give greater strength. (*Please turn to next page*)

PHOTOS ON THIS AND FOLLOWING PAGE, COURTESY CRUVER MFG. CO

Left—An exploded view of the 19 molded parts and the 4 decals which make up the cellulose acetate model. Assembly is speeded by sub-assemblies of the two engine block halves and fitting of floor board component with the throttle and the controls



Right—A 49-cavity die is used for the smaller components of the miniature tractor and is run on an 8-oz. injection press averaging 70 shots per hour

Above—Kick press operation locks concealed wheels on treads and simultaneously assembles treads to frame. Pins projecting from frame are inserted into the tread cores

Above—In two cementing operations, this worker attaches the two engine block halves together and then fastens the breather tube in position at the back of tractor engine

Below—The model tractors come off the assembly line at the rate of 150 per hour. They are packaged in cartons that are specially made to protect the protruding parts

For more efficient handling of small parts, sub-assembly operations are employed in some instances. The engine, for example, is molded in two halves—left and right—which are cemented together in a matter of seconds, greatly simplifying the molding of this intricate piece. Only from the underside of the tractor can the motor block assembly joint be detected. The breather tube, a separate molding, is later cemented in position on the back of the engine block.

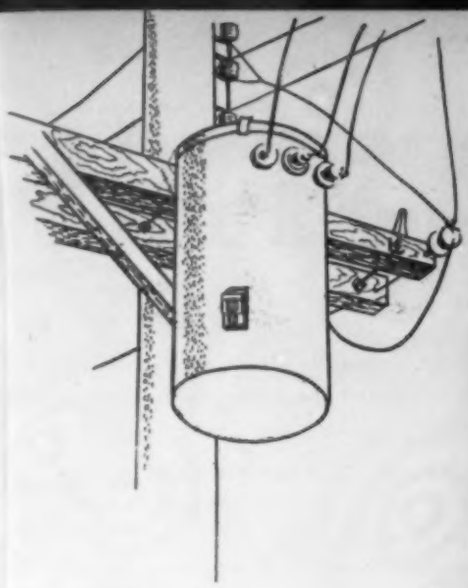
Another sub-assembly operation involves the securing of the various control levers to the floor board. The latter is cored with four rectangular and one circular hole through which the controls are inserted and cemented on the underside.

The general sequence of assembly operations on the model is as follows:

1. Concealed wheels slipped on stub axles on inside portion of left and right treads.
2. Kick press operation swages the ends of the axles to lock wheels in place, simultaneously locking the tracks and frame together with a drive fit of two sturdy shafts which project from each side of the frame.
3. Motor blocks cemented together; motor placed in frame, accurately indexed by slots and projections on the moldings.
4. Clutch pedals and control levers assembled on floor board, of which seat, fuel tank and tool box are integral parts.
5. Breather tube assembled to back of motor block.
6. Floor board cemented to body.
7. Hood cemented in position over engine, anchored at top of radiator shell and rear of engine block.
8. Application of four Caterpillar decals and packaging of the completed tractor. The models are protected against damage in the folding carton by means of a folded corrugated insert which prevents the projecting exhaust stack and control levers from striking the sides of the box.

Manufacture of the model is handled by Cruver under license arrangement with the Caterpillar company. That company, in turn, is distributing the models through its dealers, of whom there are a total of approximately 500 in this country and abroad. The dealers pass them on to qualified customers and also make use of the miniatures for display and advertising purposes. It is estimated that the Caterpillar tractor alone will require about 100,000 units per year to fill all of its needs.

Through arrangements made with Caterpillar, Cruver Manufacturing Co. is also placing the models on sale at department store toy counters, in toy and novelty shops, drug stores and other retail outlets. The retail version is exactly the same as those sold to the manufacturer, except that the breather tube assembly, control levers and pedals and the four concealed wheels on which the model moves are in red instead of the standard highway yellow. In the near future, accessories for the tractor, in the form of bulldozer and scraper attachments, will also be placed in production by Cruver.



The Thermalarm, which is shown in use above, is attached to transformer with cement. The red flag means that transformer has operated at excessively high temperature and should be checked. The melamine parts of alarm are shown assembled and disassembled

Melamine helps protect transformers

An eight-cavity transfer mold produces melamine housing and warning flag of the alarm

ELECTRIC power distribution systems are carrying the heaviest loads in peace-time history, necessitating the maximum loading of all available equipment. At the same time, it is obviously imperative to guard against dangerous overloading. Transformers are the most vulnerable elements in the system but they also provide the easiest means of checking the loading at any point in the distribution network, for transformer temperature varies in direct ratio to the load.

Several effective devices have been utilized to indicate load by measuring transformer temperature but their cost has been much too high to permit quantity use throughout the vast distribution systems. The problem of providing a simple, low-cost thermal alarm has been solved with the development by the Eastern Specialty Co. of the Thermalarm, which has two plastic parts molded of either Plaskon or Melmac by the Lance Manufacturing Co. of Philadelphia, Pa.

The alarm is housed in a melamine case $3^3/_8$ in. long, $1^1/_{16}$ in. wide and $1^1/_{16}$ in. deep with a die-cast aluminum base projecting slightly from the rear to transmit heat to the thermal element within the case. The unit is merely cemented to the case of the transformer and adjusted by a simple indicator screw to any desired temperature setting from 100 to 200° F. When the transformer case temperature (which has a known relationship to coil heat) goes above the predetermined level, the thermal element trips a latch which allows a spring-actuated flag (second melamine part) to snap up, exposing a brilliant red surface which is readily visible from the ground.

The device is produced in a transfer mold which has four cavities for the body and an additional four cavities for the flag, thus permitting the molding of the eight plastic parts needed for four complete units in each cycle.

The Thermalarm is not intended to be a precision instrument but it provides a simple, economical means of warning the maintenance man that the electrical load at that point has been above safe limits. Armed with this knowledge, he can institute a detailed load survey and from the results of this check take the appropriate corrective action.

PLASTICS

Addresses of the companies which are mentioned on these pages are listed on page 236 of this issue

Assurance for a rainy day—an umbrella with numerous plastic parts. The handle and ferrule are fabricated of cellulose nitrate rods and the rib tips are injection molded of cellulose acetate—both plastics being supplied by Nixon Nitration Works. Fabricating, molding, hand coloring and carving of the parts are done by Para-Mount Mfg. Co. Women should approve handles and ferrules of cellulose nitrate since the material is resistant to cracking and chipping, pleasant to the touch and has unlimited color possibilities

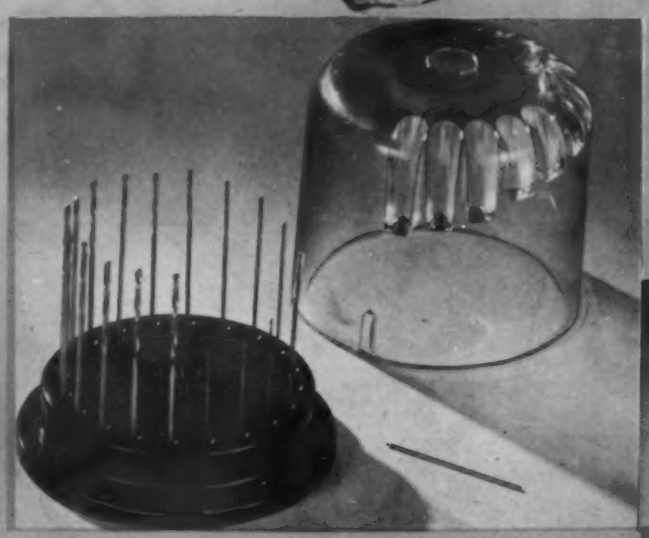
Good merchandising is the theme of Acme Plastics Hanger Co.'s child hanger set. Delightful decorations are certain to please little folks and encourage neatness. Packaging a set of hangers is a sure stimulus for greater unit sales. Majestic Molded Products, Inc., molds of Lustron

New beauty for the boudoir is found in colorful handkerchief and glove boxes. They are molded of Bakelite polystyrene by the Superior Plastics Div. of Westchester Chemical Corp. The top sections have designs molded as an integral part of the pieces. Boxes are moisture resistant and easily washed

PRODUCTS

Colorful Lumarith flower pots now make possible the complementing of bloom with pot. They are sold in round or square shapes, in eight colors or in mottled effects. Sioux Falls Plastic Co. is in limited production on pots and matching saucers that are lightweight, virtually unbreakable

At the service of the sportsman, this Thermo-Keep° bag will keep foods cool or warm and fresh for hours. Its outside covering and inside lining are Koroseal; insulation is a Fiberglas filler (insert). Nappe-Smith Mfg. Co. makes the moisture-proof, washable bag which is available in blue, red or green and in three different sizes



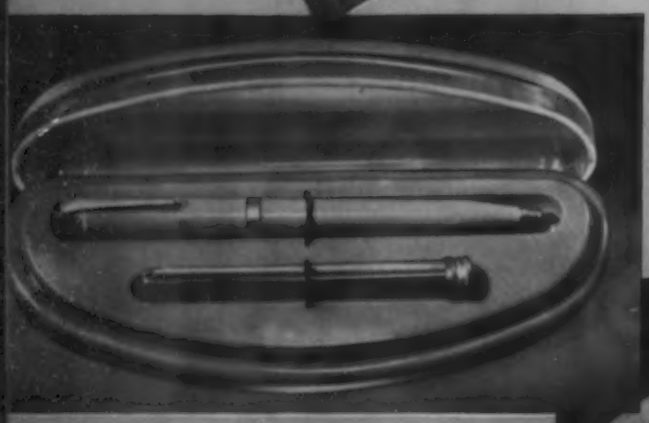
Each drill has its own individual niche for safe keeping in this Bakelite phenolic drill holder, molded and distributed by V. F. Rogers Co. On the face it seems that drilled niches are all the same size. Actually, inside each larger opening there is a smaller molded cavity, 0.014 to 0.040 in. in diameter, that holds the corresponding drill, protecting it from harm

Thick-walled housings, molded of Durez, provide the necessary protection for the Type TA process timer and Type A signal indicator, marketed by Potter & Brumfield Sales Co. Michigan Molded Plastics, Inc., molds housings, knobs and plugs

PLASTICS

Convenience of carrying characterizes the Ayvetta douche-enema bag manufactured by Ayvad Water-Wings, Inc. Its easy foldability into a compact package is rendered possible by the lightweight yet sturdy Vinylite material of which it is made. Resistant to cracking and peeling, the bag is said to outlast those made of rubber

Break the bank? Not while playing the game with a Silent Partner poker chip set made of Poly-T. The polyethylene material will not break, chip or crack and will snap back in shape after being bent. Manufactured by Tupper Plastics, Inc., the set eliminates noise and scratching of furniture, assures sanitation through ease of washing. It is available in 3 frosty shades



Two plastics are effectively used in a mechanical pencil set, molded by Arnold Brilhart Co. for Ross-Frederick Corp. The pencil is made of Lucite, having a gray barrel and a maroon top. Colored dots imbedded in the barrel facilitate selection of six colored leads. The box, also in two colors, utilizes green styrene for base and a transparent styrene cover that affords display, protection

A bowl, small tray and compartmented plate, made of Kys-Ite, combine a long list of assets which make them applicable for many uses in restaurants, hospitals and homes. The dishes, marketed by John M. Hart Co., Inc., for Keyes Fibre Co., are lightweight, rugged and may be sterilized in boiling water

Tuning in on the Soap Opera while watching the clock is made possible by this radio-clock combination. Jewel Pin-Up, manufactured by Jewel Radio Corp., has a white or ivory Beetle case which can be hung on the wall or placed on a table. Excellence of design, sturdiness of structure make it suitable for any room. The radio itself incorporates two new engineering features—a voltage control regulator and a rectifier that steps up reception, sensitivity

PRODUCTS

By equipping parking meters with Plexiglas windows in front of coin and parking time indicators, Mi-Co Meter Co. has reduced shattering and cut service costs caused by small pieces of broken glass getting into mechanisms. Windows are securely mounted in steel rabbets but are easily removed for meter servicing. J. E. Barron & Associates fabricates the acrylic

Safety is the watchword of the Fin-Grip paring knife. Its Tenite handle is molded with right hand finger and thumb indentations so it may be gripped comfortably and securely even when wet. Because it floats, the red handle gives warning of the knife's whereabouts in the dish pan. Nu Products, Inc., manufactures the knife, equipping it with a stainless steel blade

Addresses of all the companies mentioned on these four Plastics Products pages may be found listed on page 236, this issue

ALL PHOTOS, COURTESY BAKELITE CORP.

Left — Fine texture, color, durability are the contributions of plastics to this office. Phenolics are employed for laminated table and desk tops and for the laminated mahogany-surfaced wainscotting. The two chairs are upholstered with cloth coated with vinyl resin

Below—Besides use of phenolic resin in laminated cabinet and radiator tops and cabinet door paneling, plastics may be found in this office in extruded vinyl baseboard trim which is easy to clean and scuff resistant, and in the draperies that are made up from vinyl film in various colors

Decorating with phenolics and vinyls

Plastics' uses include flooring, desk and radiator tops, drapery, upholstery, paneling, baseboard trim

AN excellent indication of the utility and beauty that may be imparted to an interior when plastic materials are correctly applied in finishings and furnishings are the remodeled interiors of the Bakelite Corp.'s sales and executive offices in New York City. Bakelite and Vinylite materials appear throughout as decorative laminates with rare and authentic wood veneer surfacing, as resin-bonded plywood, molded elastomeric floor tiles and extruded stripping, flexible film and sheeting, and resin-coated fabrics.

In each application—many of which are shown in the accompanying illustrations—the particular plastic used was carefully selected for the durability, beauty and design possibilities it afforded. For example, the phenolic laminates used for the tops of radiators, cabinets, tables, desks and for the elevator facades assure long wear. The tops are cigarette-proof, an important factor in the first three applications. Beauty and durability are again combined in the phenolic resin-bonded plywood used as wall paneling in some offices.

Vinyls have been used from floor to ceiling—each application benefiting from the material's combined qualities of wear resistance, easy cleaning and colorability. There is the use of this material for the floor tiles in the reception lobby where traffic is heaviest. Vinyl in extruded form is employed for baseboard trim where it offers a pleasing contrast to the room's color scheme and keeps the wall bases neat in appearance because it is scuff-proof and easily cleaned. This same resin coats the cloth used for chair upholstery, and for the covering of telescoping doors that are used, at times, to divide a large display room into smaller sections. And, finally, the vinyl in sheet form is used for window drapes and wall covering.

Below—Vinyl sheeting is used in a novel manner in wall draperies. Two different colored films, one transparent and the other opaque, are combined to create shimmering effect. Vinyl is again employed as a coating for chair upholstery

Above—Still another wall effect is achieved in this office where the phenolic resin bonded plywood has a claro-walnut surfacing. The light color of the vinyl coated upholstery and laminated desk top offers effective contrast to wall

1—(Right) Fixtures, such as the tooth-bar brackets shown at the right, are molded of polystyrene and supplied in standard and deluxe designs

2—(Left) Fixtures are individually packaged, different packages being used for the deluxe line than for the standard. The difference between the deluxe fixtures, packaged in container at the extreme left, is that they are larger, have thicker wall sections and have more flexible methods of mounting than those of the standard line

Molding and marketing three lines

Wear, appearance, price were all considered in the development of all three of these 14-piece fixture lines

A GOOD case history of the successful production and merchandising of a plastic product is to be found in the line of bathroom fixtures put out by Columbus Plastic Products, Inc., of Columbus, Ohio.

When this company set out to produce what are among the nation's most complete line of plastic bathroom fixtures, it delved deeply into the following factors: 1) conditions of use; 2) market for variously priced goods; 3) competitive products; 4) means of distribution.

As a result of these investigations, the company chose polystyrene as the material for its products, decided to bring out three lines so as to hit both the low and higher priced markets, and elected to package its own merchandise and sell directly to jobbers, large retailers and to the national chains.

Material selection

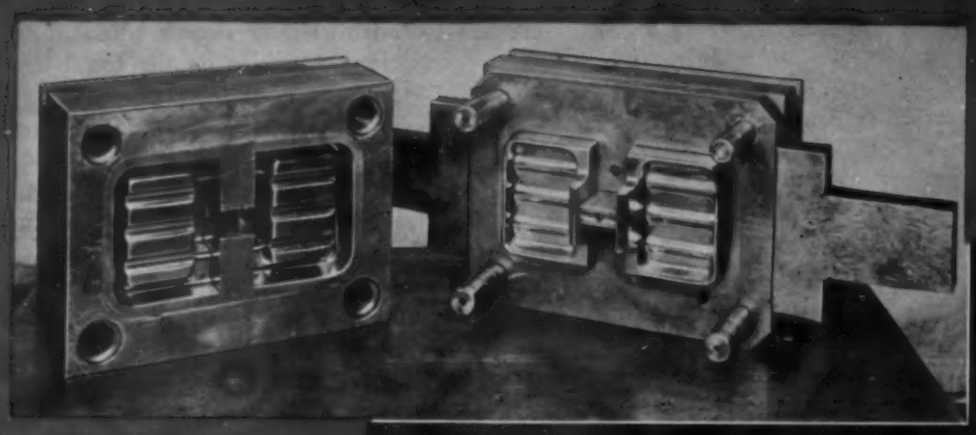
Bathroom fixtures must withstand continuous usage by all types of individuals, with exposure to moisture, warm temperatures and cleaning agents the rule rather than the exception. In addition, they should attractively complement the general decorative scheme of a room being of a design and material easy to clean.

Polystyrene was felt to meet all these conditions. It has good dimensional stability, rigidity, water resistance, color range and surface gloss. Further, it displays excellent resistance to alkalies, alcohol and to such household liquids as perfume. To date, the bulk of the production on the Lustro-Ware fixtures, the name for this company's three lines, has been in Styron, Lustron and Bakelite polystyrene.

The complete range of these fixtures consists of a low priced standard line, surface attached with concealed screws; a higher priced Deluxe surface attached group; and a Deluxe built-in line. There are, incidentally, 14 basic pieces in each line, varied to suit the type of attachment desired.

Selling methods

At present, all three lines are available in white, black, bright red and pastel green. White sells about 12 to 1



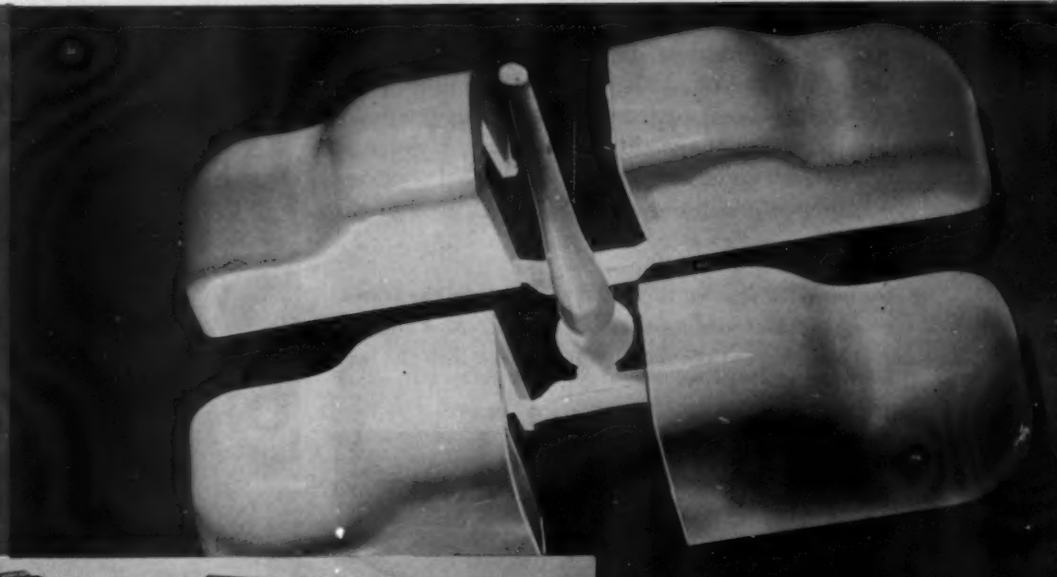
3—(*Left*) *The 2-cavity mold for molding this deluxe soap dish is shown here. Dies are run on injection machines of 12-oz. capacity on 16-hr. basis*

4—(*Right*) *The deluxe soap dish, showing the slot which engages the wall plate in attachment. Built-in soap dishes are available in recessed and projecting designs*

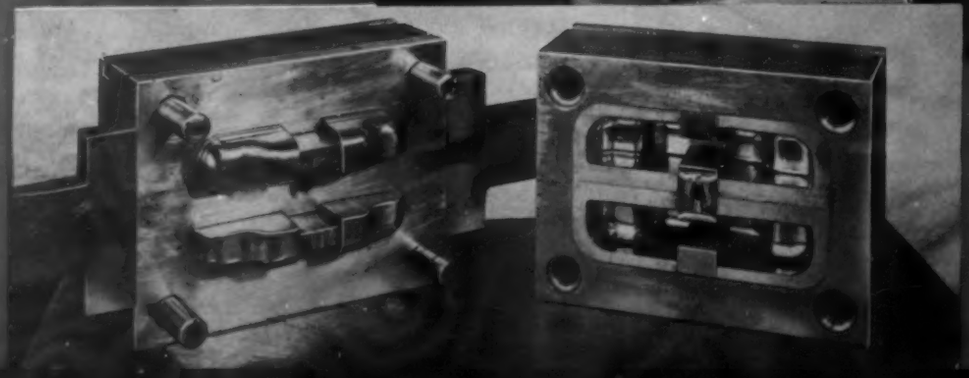
# of STYRENE bathroom fixtures

PHOTOS. 3 THRU 7 COURTESY COLUMBUS PLASTIC PRODUCTS, INC.

5—(*Right*) *The deluxe towel bar brackets as they appear after removal from mold. Gate is later finished off and the brackets are drilled to receive the metal towel bar*



6—(*Below*) *The 4-cavity mold used in molding deluxe towel bar fixtures. The cavities in this steel die are hobbed*



over black, the next most popular color. Current merchandising emphasis is on the complete sets although later it is planned to promote additional sales of the red towel bars for kitchen use. All towel bars, incidentally, are of steel tubing, with a rust preventive coating on the inside and an outside finish of high quality enamels.

The company has no illusions about the ability of plastic products to sell themselves merely because they are plastic. On the contrary, plenty of merchandising effort has been placed behind the Lustro-Ware line to build up solid acceptance. Each fixture is individually boxed (Fig. 2); 12 fixtures of a single color are then packed in the master carton, with the exception of the standard robe hook and towel bars. Standard robe hooks are placed 12 to the box while towel bars are individually wrapped and are also packaged 12 to the paperboard carton.

Considerable merchandising flexibility is achieved by having the three distinct lines, available at different price levels. The difference in price between the cheaper and higher priced lines reflects differences in material, molding and finishing costs. Wall sections of the Deluxe fixtures are much thicker than those of the Standard line (Fig. 1). Also, the Deluxe fixtures are larger than comparable Standard pieces (Fig. 1). Dealers are provided with illustrated sheets, electros, newspaper mats and display panels to assist them in merchandising the fixtures.

Fixture design and molds

After the original conception of the fixtures, several months were spent working out design and engineering problems under the supervision of Nate Roop, chief engineer and designer. Following the completion of molding engineering, actual work on the molds began in mid-1944, and more than a year was devoted to actual mold production. Most of the dies were made in the company's own toolroom, although a few were farmed out in order to expedite the program. Some of the cavities and cores are chromium plated; others merely hardened and polished. Die steels used in the molds were selected with extreme care to afford long life and best production. Cavities on the towel bar bracket were hobbed; all others, machined.

The molds range from one to six cavities, depending on their size and complexity. The large recessed soap dish is molded in a single cavity die; the Standard soap dishes in a four-cavity die and the Deluxe dishes in a two-cavity mold (Figs. 3 and 4).

The various dies are run on injection machines of 8-, 12- and 16-oz. capacity, with production maintained on a 24-hr., 6-day-week basis. Accurate control of molding temperatures is credited with an important part in the successful molding of the mixtures, most of which are run with a temperature of between 450 and 500° F. in the heating chamber.

Stripper plate dies are used on the Deluxe soap dish, toothbrush and tumbler holder, towel brackets and towel bar plates, and on the Standard soap dishes, toothbrush and tumbler holders and several other fixtures. Plates were employed on these molds not only to provide more positive ejection of the molded parts, but also to avoid unattractive knockout pin marks on the underside of the pieces. The latter is not a problem as long as the fixtures are run in colors, but would be if some of the sets are later run in transparent material. With this possibility in mind, decorative lines have been designed into the reverse side of several varieties of the fixtures.

Production rate

Production figures on some of the pieces are of interest. The large built-in type toilet tissue holder, weighing 5 oz., is molded at a rate of 60 per hour. The towel bar brackets are produced at a rate of 360 units per hr.—the 4-bracket sprue weighing $4^{3}/_{4}$ ounces. Robe hooks (two-cavity mold, total weight $2^{3}/_{4}$ oz.) are produced at 205 pieces per hour. Hooks are molded in two halves and cemented together.

Fixture attachment

Each fixture in the Standard line is fastened to the wall by the use of a wedge locking attachment plate which is screwed directly to the wall. The slot in the back of each Standard fixture which fits on the wall plate is punched out by a stamping die which insures an accurate fit between the slot in the fixture and the attachment plate (Fig. 7).

The deluxe line is also available with the wedge locking attachment plates. The built-in styles are available in both recessed and projecting types.

There are relatively few finishing operations necessary on the Lustro-Ware fixtures except for the trimming of gates. Towel bar posts are drilled to hold the metal towel bars and the Standard fixtures are slotted to receive the attachment plate lug. On the recessed soap dish in the Deluxe built-in line, designed for placement in the wall beside the bathtub, the grab bar is fastened to the dish by means of four Parker-Kalon self-tapping screws.

7—A stamping die is used to punch the slots in the standard type of tumbler and toothbrush holder. Slot engages the metal attachment plate which is screwed into the wall

The two newest models of these polyethylene wrist watch straps simulate alligator and pigskin. They combine an attractive appearance with excellent wearing qualities

The "why" of polyethylene watch straps

PRODUCTS such as watch straps, whether they are designed for men, women or children, must combine style with good wearing qualities. The first factor is responsible, in the main, for initial sales. The second characteristic—wear—will bring in the repeat business desired.

The watch strap samples mounted on this card speak for themselves as far as appearance goes. Sell copy brings out wearing qualities imparted by use of polyethylene

Realization of the importance of both style and wearing qualities is apparent in the new polythene watch straps recently brought on the market by the Pla-Safe Plastics Corp. of Buffalo, N. Y. The illustration at the top of this page shows the two different grains that are molded into these straps, top and bottom. The simulated pigskin is marketed under the name of Pigette, the simulated alligator under the name of Polygator. The graining, the simple metal buckles, and the white, tan, brown and black colors in which the straps are available are the company's solution to the style problem.

The wear comes from the selection of polythene for the molding of the straps.

Selling what you have

But no matter how good the style or how long wearing the material neither factor will have its full effect on initial and repeat sales unless it is brought forcefully and repeatedly to the attention of the public. How Pla-Safe Plastics Corp. meets this third selling hurdle is to be found in the illustration at the left. Counter cards have been made up for both types of straps—the Polygator and the Pigette—so that maximum display is given the graining molded into the material.

Under each of the six straps mounted on the display, and not to be overlooked by anyone even glancing at the watch bands, is printed a different selling line. Taken as a whole these selling points present all the advantages of injection molded polythene straps as compared with wrist watch bands of leather, metal or

cloth. The main advantages of employing polyethylene in this application are:

1. Flexibility, regardless of climatic conditions, and smoothness.
2. Non-irritating to the skin even in the hottest weather and guaranteed not to cause dermatitis.
3. Good strength properties and non-cracking characteristics. The straps have been tested and found to support 70 lb. when wrapped around mandrels simulating the human arm.
4. Stretch-proof.
5. Easy to clean and unaffected by perspiration, body acids, salt air, water or humidity.
6. Lack of odor.
7. Absence of stitching which might rot or rip.

The properties of the plastic used in these straps combined with the appearance of the straps themselves fit these watch bands for almost every market, the most rugged, perhaps, being that of the laborer. A tribute to the strap appeal is the fact that the Elgin National Watch Co. has adopted the tan Pigette model as standard for two of its models.

Development of polyethylene straps

These Pla-Safe straps, injection molded by the Franklin Plastics Div. of Robinson Industries, Inc., Franklin, Pa., are a refinement on the original straps that were brought out during the war. The first model, made in one piece, featured a patented snap fastener as an integral part of the strap. This fastener consisted of holes molded into one end of the strap which engaged with raised areas molded into the other end.

The company followed this first strap with a two-piece model incorporating the same patented snap fastener. And then came the buckle strap with molded-in square openings for the prong of the buckle.

A fabricated acrylic radio cabinet

A HANDSOME and unusual application for Lucite is this radio cabinet made by Monarch Plastics, Inc., for Cyarts Plastics, Inc., both of New York City. Except for the fiberboard that forms the back and the metal setscrews for holding the knobs, the entire cabinet is made of acrylic.

The plastic parts that make up the cabinet are: the body that forms the top, bottom and left side; the front face piece that also extends around to the right side; a two-sided silver-colored ornamental panel; the speaker ring for holding the grille cloth; and three knobs. The grille cloth is made of Plexon.

The $^1/_8$-in. thick body is formed in jigs with local heat. The $^1/_2$-in. thick decorative panel is routed out at both ends so that the front piece and speaker ring can be fitted firmly into place. Assembly is done while the pieces still retain a little heat—this permits them to be snapped together. Not until the four cabinet pieces are assembled is cementing undertaken. This operation is done with a hypo needle that emits a fine stream of H-94 cement between pieces without leaving telltale marks on the surface. The three knobs are turned out of 1-in. rod.

In decorating the cabinet, the fabricator has used restraint and ingenuity. It is accomplished merely by routing decorative grooves on the surface of the panel and silk screening the entire piece a silver color on the under side.

An interesting part of the cabinet is the dial face. Figures and printing are achieved here by reverse engraving with a pantograph machine. When the radio is turned on, bulbs light up the dial face, edge-lighting the printing and making it show up clearly.

Several acoustical tests were made by the radio manufacturers and it was found that the cabinet actually aids in sound reception. The seven-tube superheterodyne radio was placed in a number of other cabinets made of different materials and the tonal quality was improved by putting it in the acrylic cabinet.

Taking full advantage of the colorability of Lucite, the fabricator produces the cabinet in yellow, cherry red, ruby red, butterscotch and blue. The Plexon grille cloth is also supplied in a variety of colors and color combinations which blend with or match the cabinet.

Using 3 dimensions of color in plastics

by GEORGE W. INGLE*

COLOR is a complex subject. But its critical importance to plastics requires that the millions[1] of possible colors be organized in useful form. This need is a real one for the color laboratories of materials manufacturers, to whom the problems of color selection and specification are directed. Here it is important to use an arrangement of colors which can expedite the selection of an old formulation which satisfies a new requirement. A practical and relatively simple system has been developed to meet this need of one materials manufacturer, but it is adaptable to use by other organizations in the industry.

Consider a file of samples of color-matches, arranged in order of color, which provides in immediately accessible form every color-match prepared in the laboratory. In this file there is one and only one place for a colored sample. If an old color-match has been made which will match a desired color-sample satisfactorily, it will be found immediately. Its location with respect to its neighboring colors is determined immediately and systematically; there is no waste of time regardless of the sample sought.

Hue, value and chroma

Obviously such a file requires a systematic designation of color. The system itself is simple; it needs to be no more than continuous and numerical scales related to the three accepted dimensions of color—hue, value and chroma. The hues of colors are generally their best known dimension. These are arranged in this order—violet, blue, green, yellow, orange, red, purple and back to violet. The value of a color is the dimension we associate with the adjectives "light" and "dark." Value distinguishes white from black—white having the most and black the least value. Chroma, the third dimension of color, is perhaps the most subtle to detect. White, gray and black are said to have zero chroma. These are "achromatic" colors which contrast with the brilliant or saturated colors of such pigments as Hansa Yellow or Toluidine Red. Between these two extremes are the intermediate gradations of chroma.

It is sometimes helpful to compare the world of color with a globe representing the earth. White can be located at the North and black at the South Pole; these two extremes and the intermediate neutral grays between them lie on the achromatic axis. Around this axis are the hues; their graduation is similar to longitude. In the world of color any point within it, as well as upon its surface, is an important color. The greater distance there is between this point and the achromatic axis, then the greater is the chroma of that particular color.

These dimensions of color (hue, value and chroma) are the basis of the well-known Munsell color system[2, 3] but in the establishment of our filing system we have found it preferable to use the closely allied dimensions: *dominant wavelength*, *relative luminance* and *purity*, because of their simpler connection to the universally accepted colorimetric system established in 1931 by the International Commission on Illumination.[4] The required spectrophotometric measurements of spectral reflectance and/or transmittance of the colored plastics are transformed into these terms by simple computational methods[5, 6] based on relatively complex mathematics.

Numerical scales 00 to 99 are used for relative luminance, purity, and for seven ranges of dominant wavelength identified roughly by the hue names, violet, blue, green, yellow, orange, red and purple. The relations between these scales and the Munsell scales of

* Supervisor, Color Laboratory, Monsanto Chemical Co., Plastics Division, Springfield, Mass.

[1] "A psychological color solid," by D. Nickerson and S. M. Newhall, Jour. Opt. Soc. Am. *33*, 419–421 (July 1942).

[2] "Munsell book of color," The Munsell Color Company, Inc., Baltimore, Md. (1929).

[3] "Final report of the O.S.A. subcommittee on the spacing of the Munsell colors," S. M. Newhall, D. Nickerson and D. B. Judd, Jour. Opt. Soc. Am. *33*, 385–418 (July 1943).

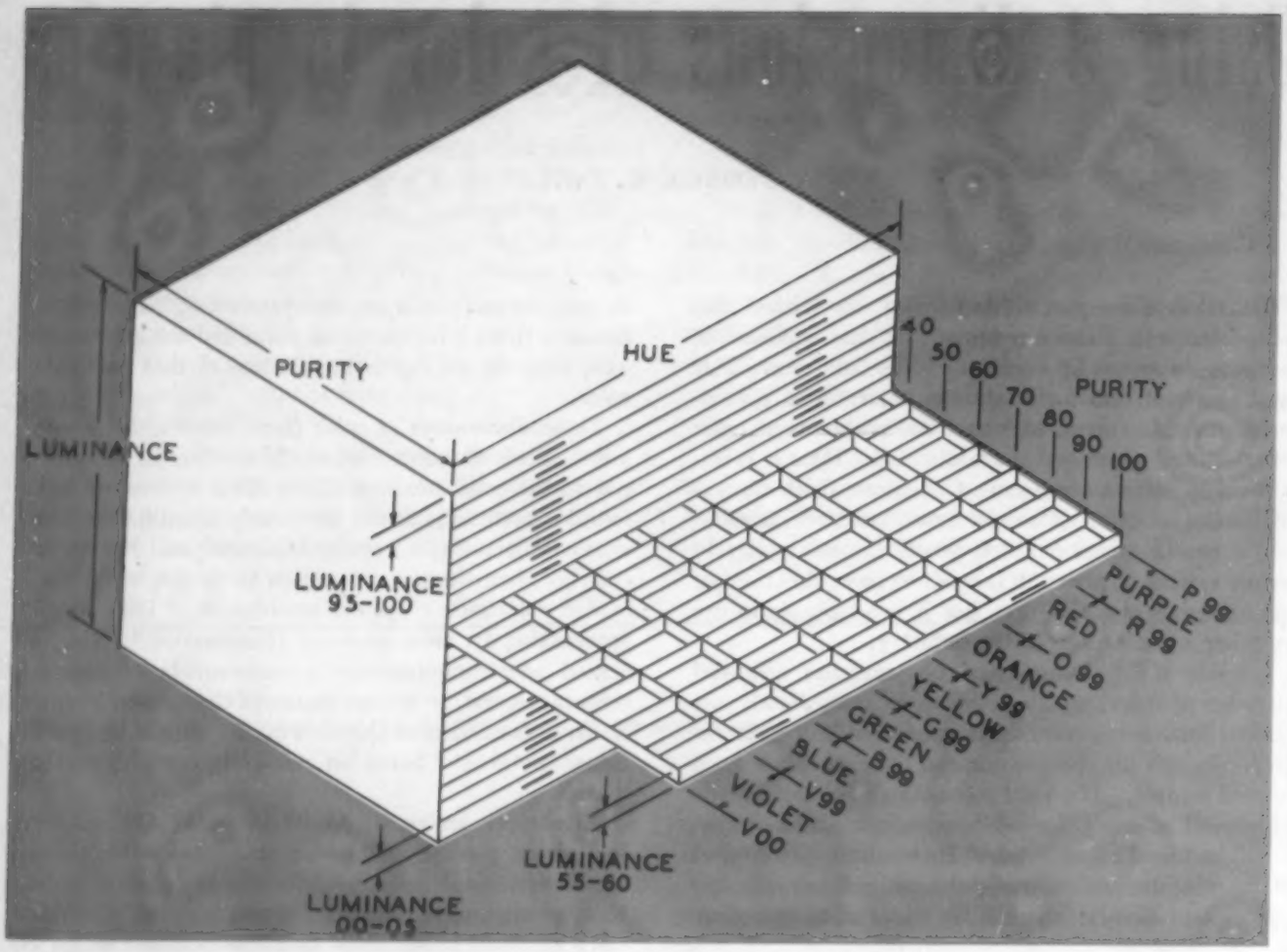
[4] "Handbook of colorimetry," by A. C. Hardy, et al., The Technology Press, Massachusetts Institute of Technology, Cambridge, Mass. (1936).

[5] "Supplementary selected ordinate method of tristimulus integration," by G. W. Ingle, Jour. Opt. Soc. Am. *33*, 349 (June 1943).

[6] "Quantitative data and methods of colorimetry," Committee on Colorimetry, Jour. Opt. Soc. Am. *34*, 633–688 (Nov. 1944).

Selection of color is a question that arises in the development of virtually every application of plastics. On thousands of occasions each year molders, designers, merchandisers thumb through color chips or swatches seeking the precise color demanded for functional, decorative or promotional requirements.

This subject is particularly important for plastics since tons of these materials are used annually in preference to other materials simply because of their color. Further, the essentially colorless nature of many plastics makes possible a greater number of more vivid colors than can be produced in other materials.



This diagram shows the type color samples file which can be used to match color quickly. This system has continuous and numerical scales related to three accepted dimensions of color—hue, value and chroma

value, chroma and hue[3, 7, 8, 9] have been published.

It has been found unnecessary to calculate by this system the color for every one of the several thousand samples in this file. The eye of an observer with normal color-vision, and with a complete understanding of the three-dimensional nature of color, is an excellent detector of small color-differences; with correct illumination it provides accurate estimations of the numerical designation of colors by interpolating between other closely adjacent colors computed previously. Errors which result from this rapid method of approximation become obvious as the file becomes more complete. They may be corrected by estimate or by complete calculation.

One may ask why the color standards of the Munsell Book of Color[3] and those of the Foss-Jacobson Color Harmony Manual,[10, 11] all of which are known in terms of the standard I.C.I. system, could not be used in this way and thus eliminate the necessity of making spectrophotometric studies; also why cannot the Munsell or Ostwald color systems be used thus directly as the basis of the color file. The answer is chiefly that these sets of color standards would be applicable for filing many plastic colors, but they do not cover the whole range of colors available in opaque and transparent plastics. Existing color standards thus have to be extended in range; and in some regions of the color-world spaced more closely to permit color classification within small tolerances common for colors in plastics.

Constructing a file cabinet

The construction of a file-cabinet to hold colored samples arranged by this system involves a compromise. Ideally the file should be so large that in it there would be but one place for each perceptibly different color—but this is obviously impractical. The space available dictates the size of the file, and this in turn, combined with the desirable size of the samples themselves, fixes the maximum number of samples which can be filed. The total number of spaces available should not be so small that within any one space

[3] "An analysis of the Munsell color system based on measurements made in 1919 and 1926," by K. S. Gibson and D. Nickerson, Jour. Opt. Soc. Am. *30*, 591–607 (Dec. 1940).

[7] "Trichromatic analysis of the Munsell book of color," by J. J. Glenn and J. T. Killian, Jour. Opt. Soc. Am. *30*, 609–616 (Dec. 1940).

[8] "Methods of designating colors," by D. B. Judd and K. L. Kelly, Research Paper 1239, National Bureau of Standards.

[9] "Analysis of the Ostwald color system," C. E. Foss, D. Nickerson and W. C. Granville, Jour. Opt. Soc. Am. *34*, 361–381 (July 1944).

[10] "Keyboard for color," by E. S. Jacobson, MODERN PLASTICS *20*, 57–58, 118, 120 (Feb. 1943).

one would find a confusing collection of colored samples. Within these limits a file cabinet (see opposite page) was constructed which loses few of the advantages of the ideal arrangement. Twenty drawers are located in this cabinet, one above the other. Each drawer contains five units of relative luminance, 00 to 05 in the lowest, and 95 to 99 in the top-most. Each drawer is divided into seven compartments by six partitions parallel to the sides of the drawer. From left to right, these compartments, in each drawer, are labelled with seven hue names—violet, blue, green, yellow, orange, red and purple. Each hue division contains one-hundred gradations—V00 to V99, for example, represent the two extremes in the series of violet hues. Furthermore, each compartment is divided into ten sections by nine partitions parallel to the front of each drawer. Each section contains ten units of purity, 00 to 09 nearest the back of each drawer, and 90 to 99 nearest the front. While these simple divisions are arbitrary, they can be related immediately to those of any other color-specification system which is expressible in terms of the fundamental I.C.I. designations, particularly the most recent and complete definition of the Munsell system.[11] This file has space for 142,000 colored samples; it is thought that this is sufficiently large to provide a practical limit to the number and variation of colors in each section. It is known that certain of these sections can never be occupied by colored samples.[12]

Reflected color for translucents

Certain simplifications are necessary. A standard thickness is used for all samples. Obviously opaque samples must be filed by their reflected color, but translucent samples are filed only by their reflected color measured over a background of essentially zero reflectance. If desired, of course, an additional sample of each translucent material could be filed by its transmitted color, as the transparent colors are. But, since this file is organized to locate systematically plastic samples which match another very closely, if not identically, only one specified arrangement for filing translucent samples is necessary. Each sample is marked with not only its identity but also its numerical color-designation. R 01 0 27 44, for example, indicates that: 1) The hue of the color is red, but only one percent between the limits orange-red (R 00) and purple-red (R 99); 2) the sample is opaque (0) at the standard thickness; 3) the relative luminance of the color is 27 percent (27) and 4) the purity is forty-four percent (44); R 01 0 27 44 is a fairly dull and dark orange-red which could be described as *garnet brown*.[13] G 95 T 30 92, for another example, is a bright, transparent yellowish-green with a transmittance of 30 percent. G 83 D 60 27 is also green, but it is bluer, translucent (diffusing), higher in relative luminance and lower in purity—a pleasant pastel green without a common name.[13] Mottled and configured combinations of colors can be filed but only by an arbitrarily selected procedure, by the type of design or by a visual interpolation of the color of the principal component or of the overall appearance. Samples containing luminescent dyes and/or pigments can be filed, but only by their visually interpolated colors, since most spectrophotometers cannot measure this type of sample accurately. Phosphorescent samples, labeled as such, can be filed by the color of their *after glow* which can be specified almost as precisely as that of non-luminescent material.[14,15]

Relation not color name

The uninitiated might be puzzled at first by the absence of common color names, such as pink, brown, white and black in this file. His study of it will show him at once that these colors are in the file and are so located that he understands readily the nature of these colors in terms of the three dimensions of color. He finds that pinks will be distributed over the orange, red and purple hue-compartments, but that all will be in the higher luminance-drawers and generally in the lower purity-sections. Browns are located throughout the green, yellow, orange and red hue-compartments, in the lower purity-sections and in the lower luminance-drawers. He may be surprised to find that whites may be any one of the seven hues, and that they are always in the lower purity-sections and in the very high luminance-drawers. But he does learn quickly the relations between the many colors in plastics.

This file is used to expedite the plastic manufacturer's color-matching service to the molders and fabricators who are his customers. These consumers desire, and as quickly as possible, color-matches which are either spectrophotometrically exact or merely approximate, depending upon the end-use of their plastic material. Certainly the color of a single plastic article need not be as critical as that of a plastic component of an ensemble of parts in which identity or harmony of color is the essential sales attraction. With this in mind, and with the knowledge that his plastics supplier is organized to give him quicker service depending upon his care in specifying his color-matching tolerances, the molder or fabricator will expect—and will receive—the best service. He will know that an approximate color-match in an established formula can be determined in seconds after receipt of his sample. For every color-match selected in this way, and approved by him, he will know that more time will be available to develop by spectrophotometric methods, his color-matches which require extremely close tolerances. If the customer desires to select a range of colors to produce attractive harmonies in his product, he knows that his plastics supplier can show him in minutes a collection of thousands of colored samples in color-order, that are available in several plastics, and ready for production.

Which color will you have?

[11] "Theory of maximum visual efficiency of colored materials," by D. L. MacAdam, Jour. Opt. Soc. Am. 25, 249–252, 361–367 (1935).
[12] "A dictionary of color," by A. Maerz, and M. R. Paul, McGraw-Hill Book Company, Inc., New York (1930).
[14] "Photometer for luminescent materials," by R. P. Teele, Research Paper 1646, Jour. Res. National Bureau Standards 34, 325–332 (April 1945).
[15] "Specification for tape; luminescent (phosphorescent), adhesive-backed," United States Maritime Commission, Specification Number 31-MC-1, Amendment Number 1.

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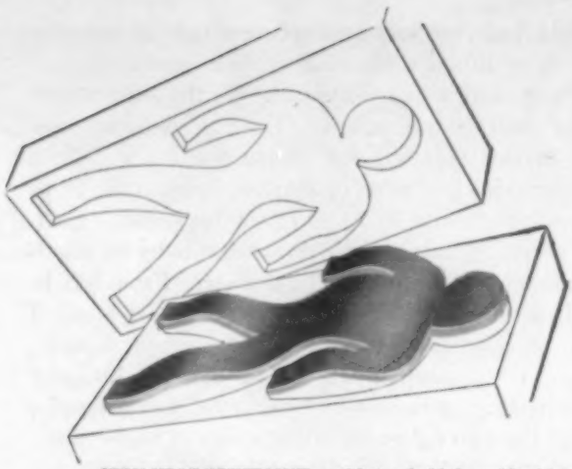

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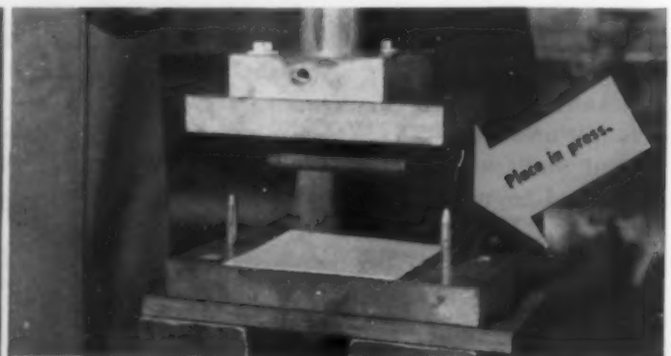

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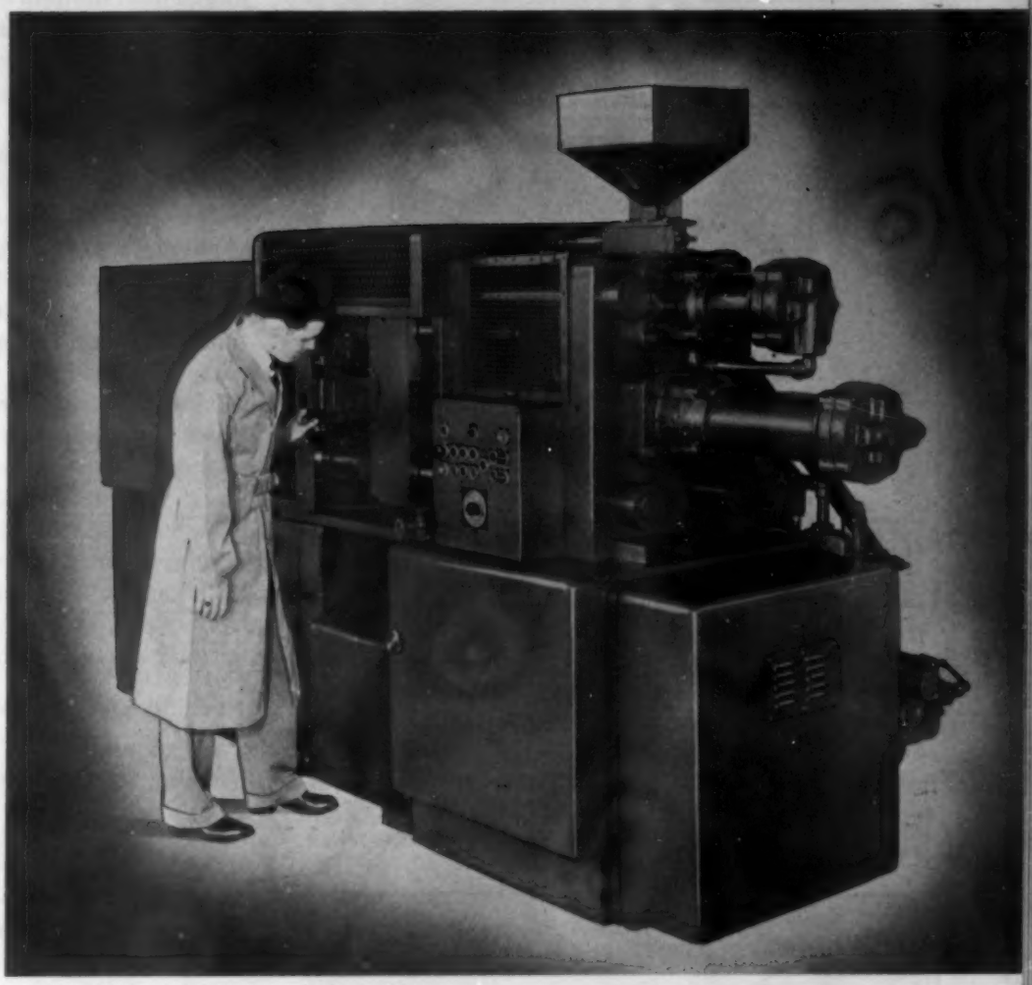


1—Over-all view of molding machine which combines four molding functions shows compact arrangement of installation of high frequency oscillator. Upper or smaller hydraulic cylinder is for preforming while longer or lower cylinder (both on right) is for forcing softened material into the mold. Operator has safety gate in open position

ALL PHOTOS AND DRAWINGS, COURTESY ROCKFORD MACHINE TOOL CO.

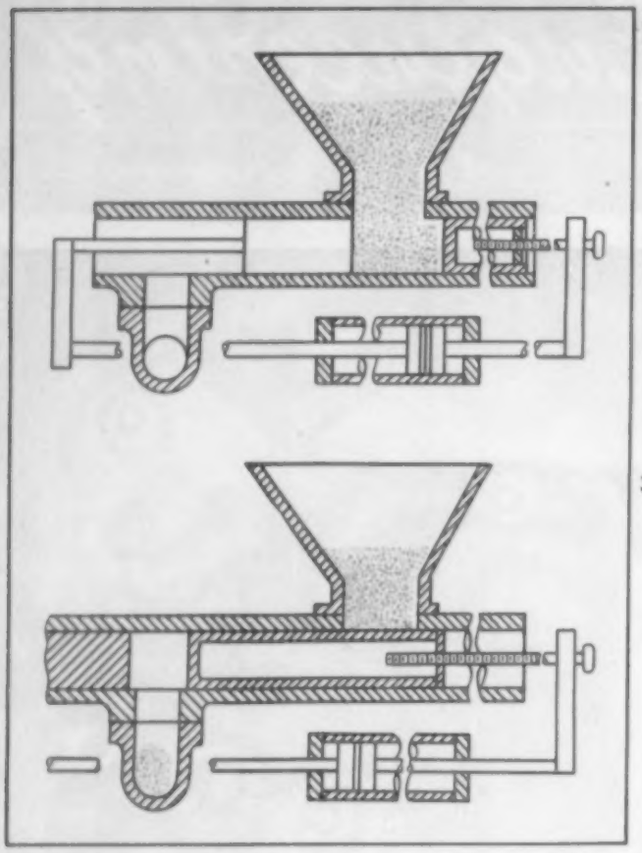
One machine with 4 molding functions

A NEW molding machine that functions automatically throughout the complete production cycle from material to finished product has been developed by the Rockford Machine Tool Co., Rockford, Ill. There is nothing new about preforming of thermosetting materials; nor is there anything new in the way in which material is metered into a chamber. Dielectric preheating of plastic materials, while quite a bit younger than the other processes mentioned, is still well known to all the trade. Forcing a softened thermosetting material into a closed mold is far from new. Yet by combining all of these operations in one machine and engineering it so that each phase operates automatically in conjunction with the others, Rockford has produced a completely new piece of plastics molding machinery. The U. S. Patent Office is generally willing to issue a patent when a combination of old processes is put into a new and unique piece of equipment if they have never been combined in this manner before and result in a new technical effect. The whole is greater than the sum of its parts and the new machine, by close integration of the successive production phases, permits a fast molding cycle at low pressures.

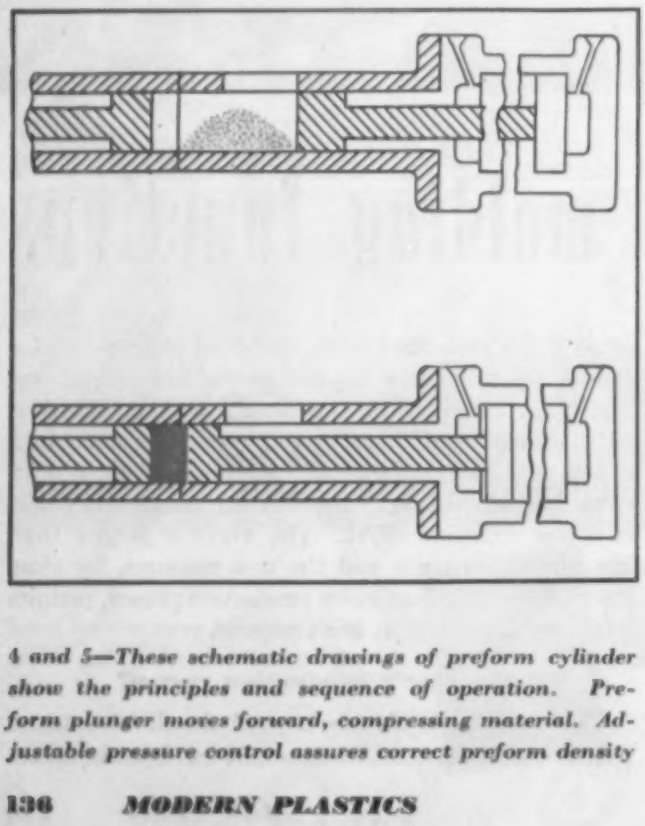
* Registered U. S. Patent Office.

Machine's production record

This machine is already beyond the developmental stage. One 4 oz. unit, for example, has been in opera-



2 (top)—*The material feeds by gravity from hopper into the measuring chamber. Waste and contamination are eliminated.* 3 (bottom)—*The forward travel of the measuring chamber piston in the cylinder blocks off the feed from hopper and carries material to throat of preform cylinder*



4 and 5—*These schematic drawings of preform cylinder show the principles and sequence of operation. Preform plunger moves forward, compressing material. Adjustable pressure control assures correct preform density*

tion at a custom molder's plant for over six months and has been producing a variety of heavy section phenolic parts, such as cabinet handles. One kitchen cabinet handle, weighing 0.4 oz., has been produced in quantity with considerable success from general purpose phenolic material. An 8-cavity mold is employed for handle. The production speed possible with this machine can be judged from the data on this job. Preheat time averages 24 sec., cure time 48 sec., but since these functions overlap an output speed of 60 cycles per hour results.

This kitchen cabinet handle is $2\,^{7}/_{8}$ in. long, $^{9}/_{16}$ in. wide and 1 in. high. The heaviest section is $^{3}/_{8}$ in. thick. During a six-month period, machine performance was continuously analyzed by Rockford engineers. Necessary design changes were incorporated wherever required. Today the engineers are convinced that their machine is a perfected production unit.

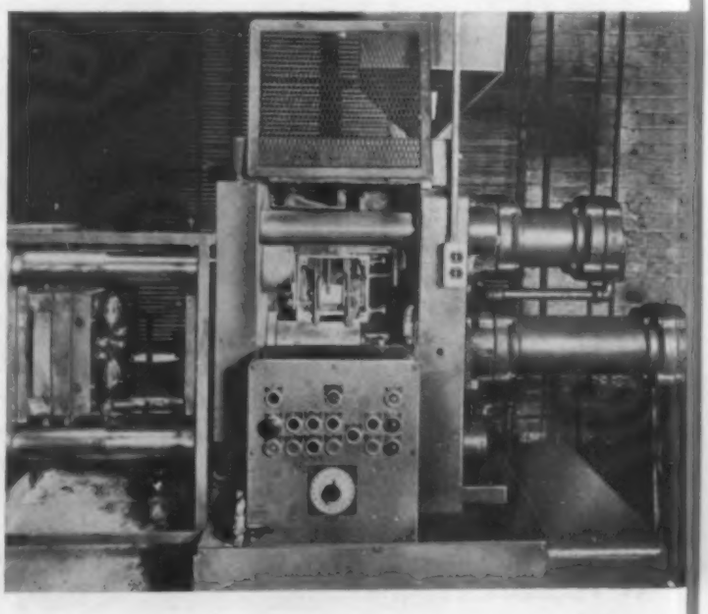
This piece of equipment was designed primarily to take advantage of the great strides made by materials manufacturers in the development of faster and more efficient molding materials. As a matter of fact, many materials can now be cured so fast that much existing equipment cannot take full advantage of the short cure time. The new machine, however, is said to utilize all of the inherent qualities of modern quick-cure materials.

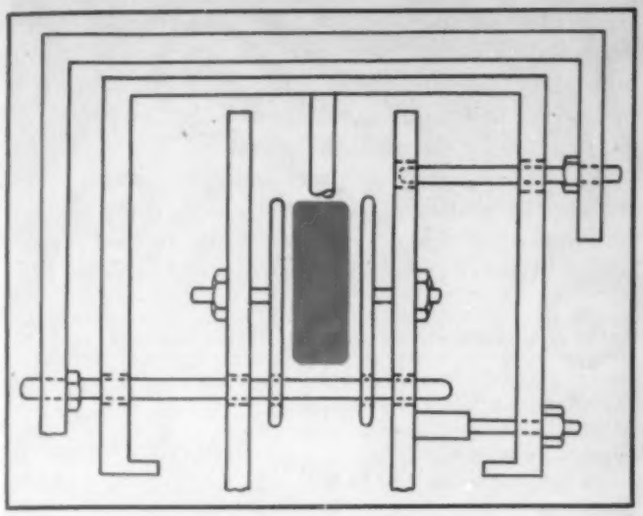
In appearance the unit looks much like a horizontal injection machine with the exception of an upper hydraulic cylinder which is used for preforming. This molding machine is shown in Fig. 1 after installation.

Production cycle

All movements of this machine are hydraulically powered, electrically controlled and automatically

6—*Close-up showing mold in open position and indicating comparative locations of material hopper, high frequency electrodes. Directly beneath preform is opening in top of molding chamber through which preform drops before being forced into mold. Safety gate is in raised position*





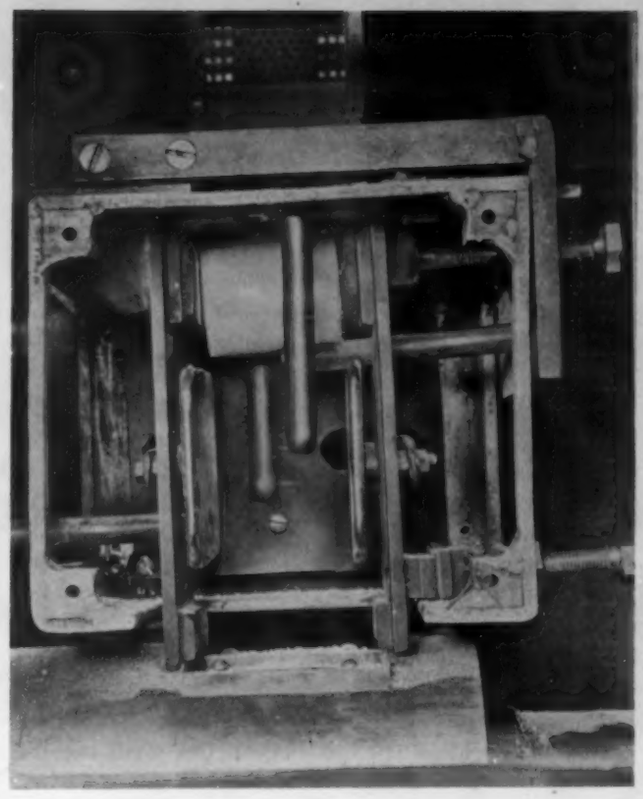
7—From preform cylinder, the preform is carried automatically into the dielectric heating chamber. Here the preform is heated to exact degree of temperature during specific period of time as set by the automatic controls

timed through a complete cycle. The material hopper is of conventional design and fills by gravity an adjustable measuring chamber (Fig. 2). From this chamber the measured amount of powder is fed, again by gravity, to the preform chamber (Fig. 3). The preform plunger automatically moves forward and makes a preform of the proper density. The preform is then held in readiness to be dropped into the dielectric preheating chamber. The setup for this phase of operation is illustrated in Fig. 5.

In Fig. 8 the two radio frequency electrode plates may be seen directly in the center of the photograph, while the preform is being held just above the top of these two plates by a rod. Figure 9 shows the preform in its preheating position; the horizontal acting preform holding rod has been moved to the right.

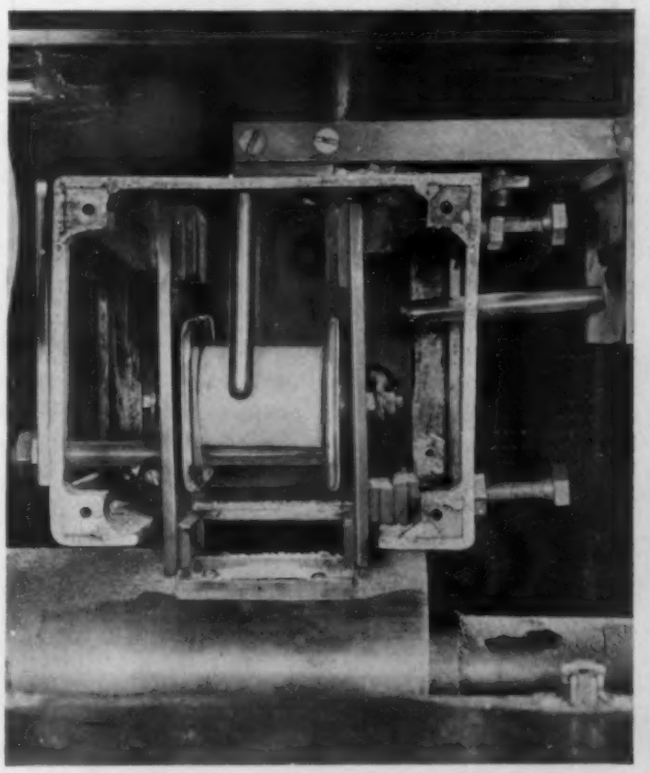
Figure 6 is a more inclusive view of this piece of equipment showing the control buttons and timing units. The preform in this illustration can be seen as it is being held between the electrodes while the mold is in open position.

The next step in the cycle of this machine is the mold closing. After mold clamping has been completed, the preform is automatically dropped from the electrodes into the molding cylinder (Fig. 10) after which the molding plunger, actuated by the lower hydraulic cylinder at the right, advances rapidly and forces the preheated material into the die. The material then passes through the runners and gates into various cavities of the mold where it completes its cure. The sequence of operations overlaps to present a preheated preform in readiness for molding as the previous moldings complete their cure. As the mold opens, the operator removes the entire shot, as shown in Fig. 12. Of course, a safety gate must first be opened by the operator before it is possible to reach in between the mold cavities and remove these parts. Any flash remaining on the force



8—Close-up of preform being held in position above the electrodes. Rod under preform will be automatically retracted to right to let preform drop between electrodes

9—Here the holding rod has been retracted and preform is between electrodes and being preheated. The opening in the molding chamber is visible just below the preform



plugs or in the cavities is then blown off by compressed air and the cycle is restarted by closing the safety gate.

Heater of special design

Builders of the machine claim that the heart of the unit is the dielectric heater which makes the entire fast cycle possible. This high frequency generator is 1½ kw. and operates at 60 megacycles. It was especially designed by Westinghouse Electric & Mfg. Co.

All movements of the machine may be push button controlled from the operator's position if manual operation is desired. This permits quick setup and proper timing of the cycle and also ease of adjustment of the various portions of the cycle as well as simple maintenance. For automatic operation a complete cycle is actuated from the control panel and once the timers and controls are suitably set, they interlock and assure complete and accurate cycling with no further attention.

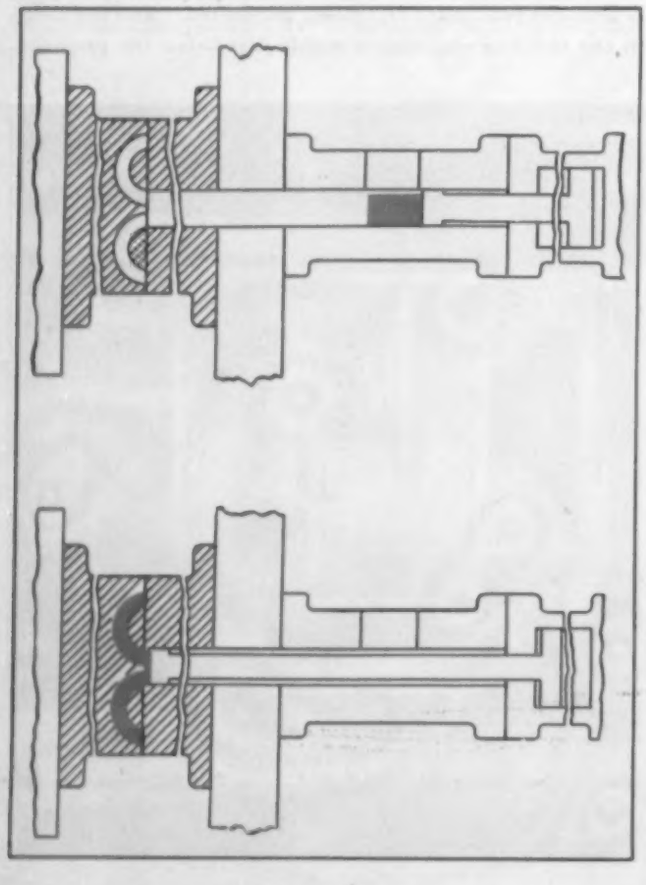
A patented hydraulic circuit makes the preforming and molding movements fast and powerful without the use of accumulators or double cylinders. The builders claim that the hydraulic circuit produces maximum speed when required with a minimum horsepower input.

In this operation there is little if any flash because the mold is closed and tightly clamped before the material is forced into it. Because of the optimum dielectric preheating cycle and the minimum time lapse between preheating and molding, comparatively low pressures are required for the molding operation. This results in a minimum of wear on runners and gates as well as on the cavities and force plugs and also permits the incorporation of delicate inserts in the molded parts. Specifications of the machine are detailed in Table I.

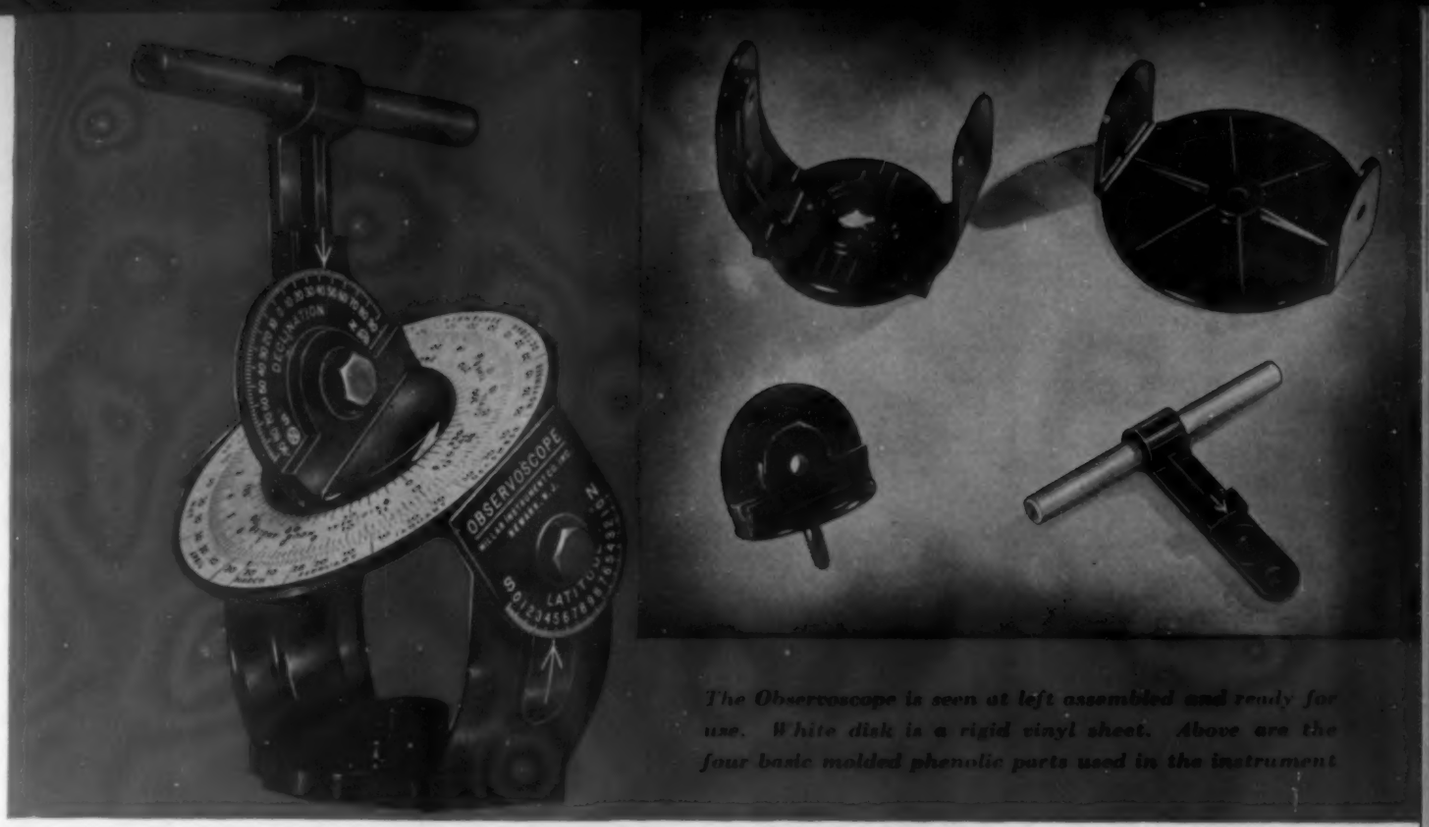
Table I.—Specifications of Model "MB" Molding Machine

Ounces per cycle, max.	8
Die clamping pressure, tons (max.)	500
Molding pressure on material, p.s.i.	19,300
Clamping stroke, in.	11
Space between strain rods, in.	11 by 14
Minimum die space, in.	6½
Maximum die space, in.	16
Travel of injection plunger beyond fixed platen, in.	6
Diameter of injection plunger, in.	3⅜
Stroke of injection plunger, in.	21½
Mold pilot on fixed platen, in.	4⅝ dia. by ⅜ long
Floor space, in.	59 by 167
Max. hp. required	15
Overall height, in.	92

10 (top)—With split-second timing, as the preform is delivered to molding cylinder, charging ram forces material into die. 11 (bottom)—Through gates in die, material is forced into all cavities. Polymerizing takes place; after set time, dies open and finished part is ejected



12—As this mold opens, the press operator removes one complete shot from an 8-cavity kitchen cabinet handle mold. While, up to the present time, most of the production on this machine has been with a phenolic material these particular kitchen handles were molded of urea



The Observoscope is seen at left assembled and ready for use. White disk is a rigid vinyl sheet. Above are the four basic molded phenolic parts used in the instrument

4 phenolic parts in observer

Good dielectric and weathering properties were reasons for selection of phenolic for these instrument parts

A NEW astronomical and directional instrument, the Observoscope, provides a simple introduction to astronomy and is finding favor with amateur astronomers, boat owners, scouts, navigation students, surveyors and teachers. Manufactured by Millar Instrument Co., Inc., of Newark, N. J., the instrument is sturdy enough for outdoor use and is unaffected by magnetic disturbances or electrical installations.

To obtain these qualities, woodflour filled Bakelite phenolic was selected for the four basic parts of Observoscope—the holder for sighting tube, base, declination and main circular indicators. The molder, Boonton Molding Co., Boonton, N. J., found that each of the four parts had one or more points in its design to make molds and molding operations quite difficult.

In three of the parts, the lettering and numerals are molded in. The problem here was that the letters and numerals are so positioned as to comprise undercuts. This necessitated removable portions in the molds. After molding, markings are filled in with white paint.

The two brass inserts molded in the base, which may be mounted on any tripod, presented yet another problem. One of these inserts is at right angles to molding pressure, a position requiring removable pin in the mold.

Because of the design requirements, the declination indicator's long threaded projection had to be molded in a solid cavity. This eliminated the split line often apparent in parts produced in a two-part cavity. An aluminum tube used as a sighting device is molded in the top phenolic piece. It was necessary to support the tube on its interior surface during molding to prevent its deformation under molding pressure.

A rigid Vinylite sheet with embossed lettering (made by Emeloid Co. of Arlington, N. J.) is fitted over the main circular phenolic part. This is the white portion shown in picture of assembled instrument.

A practical instrument as well as visual education device, the Observoscope, when properly adjusted, will solve a number of astronomical problems within reasonable limits of accuracy. It will identify, by means of the pointing sight tube, any listed celestial object in the visible sky and will locate at any hour, day or night, the position of any catalogued celestial body. It can establish approximate local civil time and demonstrate the coordinate system and apparent motion of the stars. It is valuable in determining magnetic compass error. Acting as a celestial slide rule, it can check angles, bearings and meridian lines.

Close contouring

A piece of honeycomb, for core of an airplane wing, before it is contoured to shape

After contouring, by a special process, the honeycomb has exact shape of wing section

PHOTOS, COURTESY THE GLENN L. MARTIN CO.

AIRPLANE builders, constantly striving for techniques to increase strength but reduce weight, have found extensive uses for plastic materials. One of these light but strong plastics is honeycomb.[1]

Honeycomb hard to machine

Honeycomb is made of cloth impregnated with phenolic resin and formed in a column structure just like the bee's honeycomb. Being porous, not solid, honeycomb cannot be precisely filed, cut or sawed by a machine as can, for example, a wood block. It is this limitation on the machinability of honeycomb that recently presented the Glenn L. Martin Co. with a rather difficult problem when the material was selected for use in the wing section of one of the company's experimental aircraft. The result was the development by workmen in the Martin Experimental Department, of a unique production technique, which should have wide application in many of the fields now using, or contemplating using, honeycomb structures.

Honeycomb for support

The project called for an aluminum airplane wing section, roughly 5 ft. long, with a width starting at 2 ft. and tapering down to about 1 foot. The section had a precise front-to-back contour varying from a high of 2 in. to a low of 1 in. in depth. Because of the small size of the wing section, use of supporting ribs and spars in the interior was considered impractical. It was decided, instead, to support the section on the inside with honeycomb since this plastic answered the project's specifications for size and light weight combined with strength.

Experiments soon showed that a disk sander and a saw blade could be used for the contouring of the honeycomb. This was a tedious procedure, however, generally inaccurate and totally impractical on a production basis. Thus, the successful application of honeycomb to this new airplane use became a matter of discovering a *production* method of contouring the depth of the honeycomb so that it would fit exactly inside the entire wing section.

A new cutting technique

The technique that finally resolved this difficulty involves three fixtures:

1. A wood base to hold the honeycomb.
2. An electrically operated saw.
3. A channel to hold and guide the saw.

The honeycomb is first cut to the exact length and width of the wing section in which it is to be used. The top surface of the material is also roughed down to approximately the desired contour by a disk sander. This honeycomb section is then fitted into the wooden holding base with two of its sides shaped to the exact contours desired in the finished honeycomb.

The electrically operated saw employs three lengths of band saw blades that have been spotwelded together to give a triple-thickness blade. The center

* Plant superintendent, The Glenn L. Martin Co., Baltimore, Md.
[1] Material developed by The Glenn L. Martin Co. and produced by the United States Plywood Corp., New York City.

# of honeycomb sections

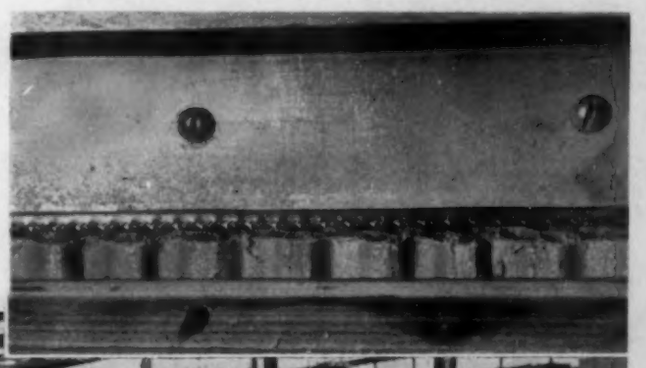
by ROBERT YOUNG*

This technique for the production contouring of honeycomb plastic sections uses a triple-bladed saw operated with a push-pull action

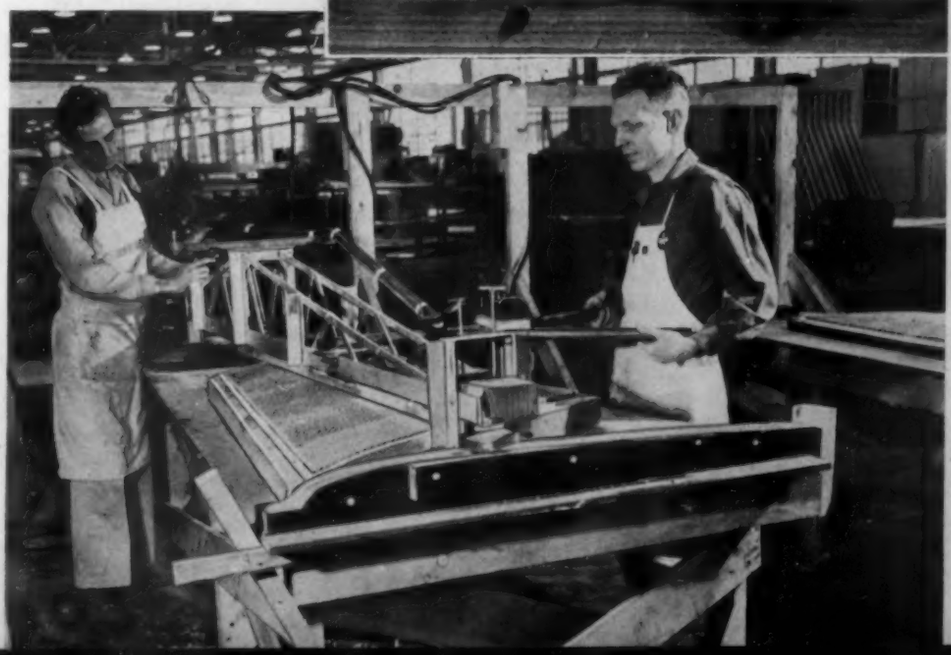
blade section is set slightly below the level of the two outer blades. So positioned, this center blade produces all the cutting action; the function of the two outer blades is to reinforce and stiffen the entire section. The saw was designed for an eccentric drive so that it would operate with a push-pull action—a $^1/_4$-in. stroke over the 5-ft. length of honeycomb.

Run by an electric motor, the saw operates from a reinforced steel channel, screws on each end adjusting the saw vertically to the size of the "bite" to be taken. One end of the channel which holds the saw runs on rollers along the wider side of the wood base—the side corresponding to the side of the wing next to the fuselage. As stated earlier in this article, this side of the base is shaped to the contours desired in the finished honeycomb. The other end of the channel is set at the vortex of the angle formed by the two lengthwise sides of the tapering wing section, a point a few feet from the narrower side of the wing section. Thus, the saw is always on a straight plane. The true contour is obtained on the honeycomb because one end of the saw's channel is "riding" the same contour on the wood base while the other is at the vortex of the wing section's own angle. The setup of the saw is quite clear as shown below.

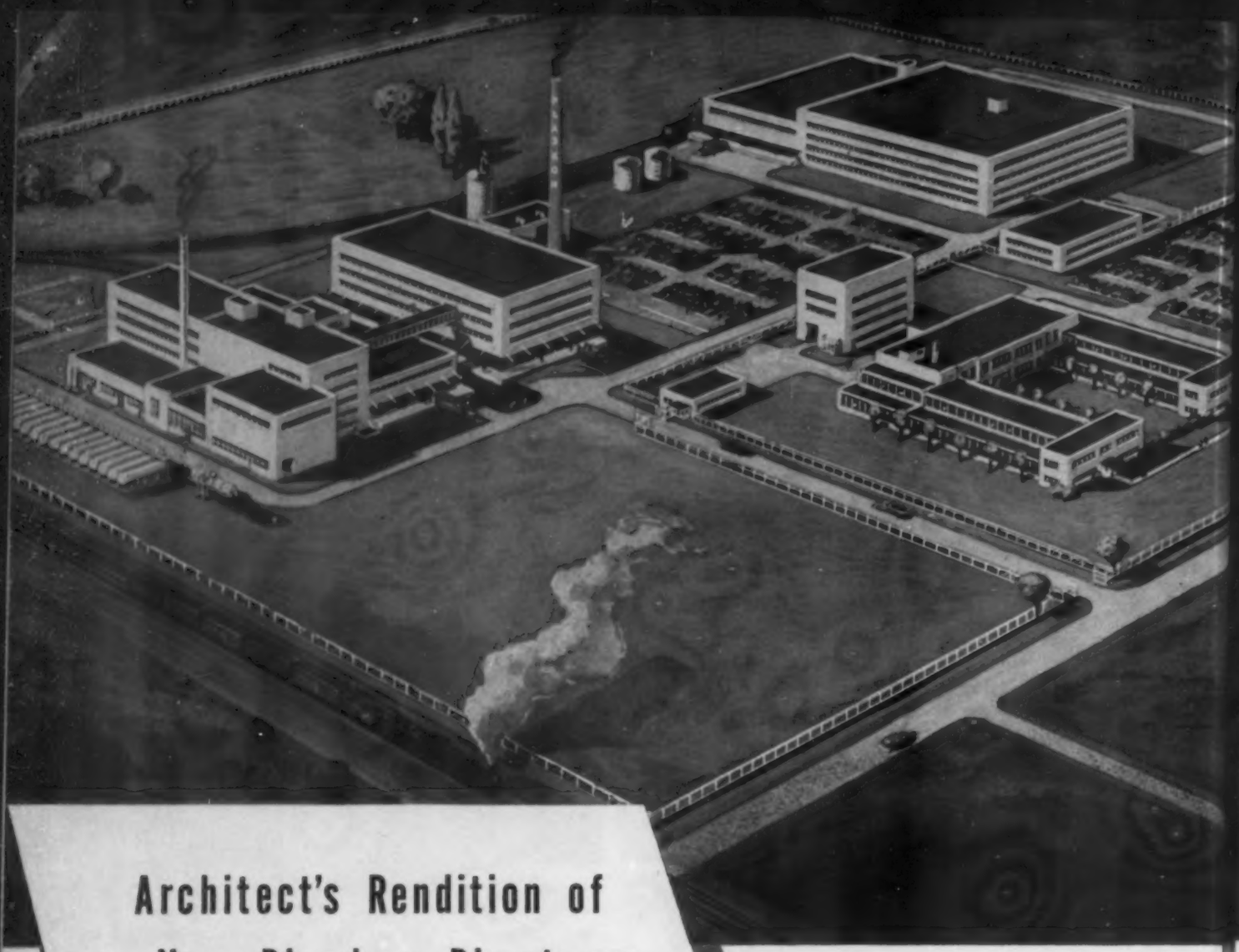
How well this machining technique has worked out is evident from the fact that the final honeycomb contour shaped in this way is accurate to within $^3/_{1000}$ inch. And the accuracy of this contouring is being obtained on a production basis which has proved to be the crux of the entire problem.



Above—A disk sander is used to rough honeycomb to approximate size. Below—Close-up of the three-bladed saw cutting honeycomb, the next step in contouring process



Right—One operator adjusts the screws which regulate the vertical bite of the saw while the other operator holds the levers with which he pulls the saw channel back and forth to cut the honeycomb. Note that the wooden base of the saw channel has the contour desired for the honeycomb



Architect's Rendition of New Plaskon Plant as Announced in May, 1946

Progress R

A year ago we announced the plans for a new five million dollar Plaskon plant to be erected at Toledo, Ohio. ◆ This was an important and welcome announcement to the plastics industry, for it gave promise of increased Plaskon Materials so much in demand. We want to state again the objectives of our plans, as announced in May, 1946: ◆ "Modern equipment based on 15 years' experience by Plaskon chemists and engineers has been especially designed for the new Plaskon structures. These facilities will be controlled by efficient processes for the mass production of Plaskon molding powders, coating resins, glues and industrial resins. The new Plaskon five million dollar plant will stimulate greater research, experiment and development in the synthetic resin field; will permit vast expansion in the production of Plaskon molding compounds, coating resins, resin glues and special industrial resins; and will open

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Actual Ground Photographs Showing Construction Progress of Various Buildings in the New Plaskon Plant Group

Air View of New Plaskon Plant Showing Actual Construction Progress as of March 25, 1947

ssReport

greater opportunities for Plaskon service to the molder, fabricator and industry in general." • Today, brick and steel and machinery are rapidly giving form to the new Plaskon plant. The actual photographs shown on these pages give evidence of our construction progress made to March 25, 1947. We are confident that the various manufacturing units will come into active production of Plaskon Materials in accordance with our plans. • Plaskon Materials today include urea formaldehyde and melamine formaldehyde plastics for molding a wide variety of useful products; resin glues for bonding, veneering or laminating wood, paper, fabrics and other materials; coating resins for the paint and varnish industry, and specialty industrial resins.

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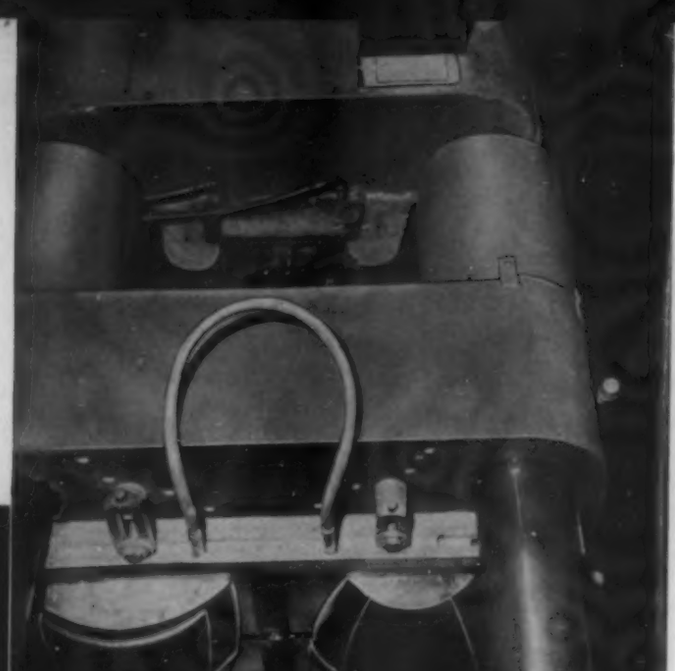
★ MATERIALS ★

Additional Ground Views Showing Plant Progress

Street lamp globes molded of POLYSTYRENE



Above—Total molding area of mold producing the polystyrene highway light reflectors, is 238 sq. inches. Lens is 16 in. high, 10 in. wide at top, 4 1/2 in. wide at bottom. Wall is 1/8 in. in thickness

Left—Polystyrene highway lenses are economical, have good diffusion, light transmission properties and are less easily broken than glass

ONE of the most universal targets for stones, beebees and assorted missiles is the corner street light. Glass is fragile and a certain segment of humanity, old and young, gains a soul-satisfying thrill at the sound of shattering glass. Unfortunately, this type of vandalism is so common as to constitute a serious problem to maintenance and safety engineers. The Broadway Maintenance Corp., which services parkway lighting fixtures, reports that malicious breakage is the greatest single cause of globe replacement. When glass is broken, moreover, the highway is strewn with sharp fragments which ruin tires, cause blowouts, and in some cases cause serious accidents.

In an effort to reduce maintenance costs and eliminate a traffic hazard, Broadway Maintenance Corp. pioneered the use of polystyrene for highway light reflectors. This was a radical departure for, despite the strides made in street and highway illumination since the gas-light era, and despite the modernization of fixture design, until now, glass has been practically the only material used. Though somewhat fragile itself, the plastic has a greater impact resistance than glass, even though produced in thinner wall sections. Even when broken, plastic pieces will not cut a tire.

Plastic panels in use

A handmade sample proved highly satisfactory in a thorough field test and as a result a 2-cavity mold was built. The lenses are now being injection molded of Lustron by Majestic Molded Products Inc. of Long Island City, N. Y. Many thousands of the new panels, called Parkway lighting fixture reflectors, are now in actual use on the parkways in and around the New York area and the Broadway Maintenance Corp. has noted that replacement requirements of those fixtures employing the plastic are decidedly lower than for those made of glass. It was not expected that these plastic parts would withstand a .22 caliber rifle bullet, but actually in most cases the bullet will penetrate the part and just leave a hole, whereas a glass reflector would have been shattered into many sharp-edged pieces.

The statistics on these molded parts are of great interest to injection molders. The two cavities have a total of 238 sq. in. of molding area. The parts are

Two polystyrene lens parts, weighing 20 oz., are turned out every 60 seconds. Once moldings are removed from machine, it is only necessary to saw off gates with a small circular saw

molded in a Watson-Stillman 22-oz. machine and are produced at the rate of approximately two parts every 60 seconds. The approximate size of the lens is 16 in. high, 10 in. wide at the top tapering to $4\frac{1}{2}$ in. at the bottom, with a $\frac{1}{8}$ in. wall section. The total weight of the complete shot from the two cavities is approximately 20 ounces. After molding, the only operation is sawing off gates with a small circular saw.

Advantages of polystyrene

This is one of the many applications in which plastics were used because they do a better job. The pebbled or stippled inner surface of this reflector, coupled with the high light transmission of polystyrene, diffuses the illumination perfectly.

The light weight of each part is a decided advantage not only in shipping costs but also in handling and assembling. The trucks used by the Broadway Maintenance Corp. are equipped with special rubber lined racks when they handle the glass lenses. In the case of polystyrene, however, there is no necessity for such special care.

In addition, there is an overall economy on the piece itself. The new plastic reflectors are purchased at a saving of approximately 25 to 30 percent over those made of glass.

After more than three months of actual service of thousands of parts, the Broadway Maintenance Corp. reports complete satisfaction with parts doing the job for which they were planned.

A POLYSTYRENE RACK HAS BEEN called upon by Griffith Laboratories to *sell* spices. This rack makes possible the assembling of 12 different spice bottles in one convenient container that can be hung on a kitchen wall or set on a shelf. Because it can be made in attractive colors and because it can easily be kept clean, the company expects it to appeal to feminine consumers. The fact that the rack performs the double duty of selling more spices at one sale, ups its value.

Chicago Molded Products Corp. injection molds the rack in white, black, red, blue, green and yellow. Polystyrene, besides its consumer-appeal, possesses an additional property which was instrumental in its being chosen for this application —that of dimensional stability. This property not only renders the rack strong enough to support the spice bottles but permits the rack to be molded in one piece. Because of the size of the piece, a 22-oz. machine is required in production.

Baby Buffet Training Trays molded of MELMAC plastic 1079 for the Lindsay Products Company by Ackerman Plastic Molding Co., Cleveland, Ohio. (Drawn from a photograph of the Nursery Department, May Company, Chicago.)

MELMAC PLASTIC ...a family favorite

Mothers and youngsters are immediately attracted to MELMAC plastic food trays. They like the bright, clean appearance.

Then, too, these trays feel good, thanks to their smooth, glossy surface. They're light in weight, though exceptionally strong. And they keep the food hot or cold as desired.

MELMAC plastic trays stay new. Having extra high resistance to scratching and staining, their color and luster are permanent. They do not absorb food odors or taste,

and they can be washed with boiling water and soap. Other nursery items... bottle-warmers, tumblers, or dishes... that must be durable as well as attractive, can be made of Cyanamid's MELMAC plastics.

In addition to required mechanical and electrical properties, this material imparts physical appeal . . . color and finish . . . to a wide range of household items such as kitchen utensils, vacuum cleaner housings, refrigerator trays, washing machine agitators, and handles for irons and cooking ranges. (MELMAC plastics are thermosetting . . . they do not soften under exposure to heat.)

If you are planning a new product, or seeking new sales advantages for an old one, investigate MELMAC plastics. Consult the Plastics Division, American Cyanamid Company, 32 Rockefeller Plaza, New York 20, N. Y.

Ford and Zenith "join up" with URAC resins

FRAMES for the wooden sections of the new Ford Sportsman's Convertible are made of laminated maple blocks with inside panels of 5-ply mahogany. Cyanamid's URAC resin adhesive 185 is used for both laminating and assembly. Danger of dried out joints is practically eliminated since glue lines of URAC resin 185 are craze- and water-resistant.

RADIO CABINETS, manufactured for Zenith by Evans Products Corporation, are made of molded plywood bonded with Cyanamid's URAC resin adhesive 185. Important production economies are effected because the adhesive requires only very low pressure and can be used with either hot- or cold-set methods of gluing.

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MELMAC* plastics—melamine-formaldehyde thermosetting molding compounds, industrial and laminating resins

URAC* resins—urea-formaldehyde thermosetting industrial resins and adhesives

MELURAC* resins—melamine-urea-formaldehyde thermosetting resin adhesives and laminating resins

LAMINAC* resins—thermosetting polyester resins

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—IN A PLASTIC SHAKER

Its ability to STAND constant USE and WITHSTAND repeated CLEANSING is due to a Claremont Filler content!

Drinks blended in the above pictured soda fountain mixer always reach the customer looking and tasting their best — fresh, appetizing and *clean*.

Molded of American Cyanamid's Melmac 3020 compounded with a Claremont Filler, this plastic shaker has the appearance and feel of fine china and the amazing chemical and physical properties of a tough plastics resin. Its rugged strength lies in the filler used —a CLAREMONT chopped cotton fabric . . . Its "good mixing" ability results from a perfect blending of resin and filler . . . Its end-use value "stands-up" and "stands-out" — light in weight, virtually unbreakable and chip-proof, will withstand boiling water and the constant wear of daily use.

Whatever the strength factors your molding compound may require, there is a Claremont filler that will meet and exceed the specifications. Available in four types (flock, thread, chopped fabric and cord), all are carefully graded, clean, uniform in size and processed to your individual needs. Samples for test runs supplied upon request. Inquiries invited!

Shaker molded of Melmac 3020, an American Cyanamid Co. plastic material. Manufactured and distributed by Devine Foods, Inc.

THE FILLER CLAREMONT IS THE HEART

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"The Country's Largest Manufacturer of Flock"

Creep, long time tensile and flexural fatigue properties of melamine, phenolic plastics*

by D. TELFAIR,[1] C. H. ADAMS[2] and H. W. MOHRMAN[3]

SUMMARY

Tensile creep data for cellulose and asbestos filled phenolic and melamine plastics indicate that they exhibit similar characteristics. The rate of elongation at 500 hr. and the total elongation at 1000 hr. are of the same order of magnitude for each of the materials.

The long time tensile strength of the cellulose filled melamine is superior to that of the woodflour filled phenolic material. The melamine has a long time tensile strength of about 67 percent of the short time value as compared with approximately 36 percent for phenolic.

Results of the repeated flexural stress tests indicate that the woodflour filled phenolic plastic is slightly superior to the cellulose filled melamine, the endurance limit for the phenolic being approximately 4000 p.s.i. or 34 percent of the short time static flexural strength, and for the melamine 3000 p.s.i. or 31 percent of the short time static flexural strength.

THE purpose of this paper is to compare the tensile creep, long time tensile strength and repeated flexural stress properties of some commercial melamine and phenolic plastic materials at standard conditions of temperature and humidity (77° F. and 50 percent R.H.). Tensile creep and long time tensile strength data[4,5] have been available on the phenolic materials discussed herein for some time and similar data are now reported for melamine plastics. Information has also been available on the repeated flexural stress behavior of various phenolic plastics[5,6,7] and comparative data on woodflour filled phenolic and cellulose filled melamine are presented here.

The importance of plastics as structural materials is steadily increasing. This trend emphasizes the need for studying the long time static and dynamic strength characteristics of these materials. The designer is particularly interested in how the structural part will hold up under a fixed load over a period of years or how it will withstand the repeated application of stress, as in the case of an object subject to vibrations.

The data presented here apply to commercial grades of molding materials and are not necessarily representative for other similar materials in which the base resin or filler has been extensively modified.

Materials and specimens used

The woodflour filled and asbestos filled phenolic molding compositions used in the preparation of the tensile specimens for creep and long time strength studies have been described in a previous paper.[4] The cellulose (purified woodflour) filled and asbestos filled melamine molding compositions used in this work were prepared by a similar process.

The specimens used in the creep and long time tensile strength tests were standard A.S.T.M. D 638–41 T

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* Presented before the Rubber and Plastics Div. at the Annual Meeting of the American Society of Mechanical Engineers, New York, N. Y., Dec. 2, 1946, and published herewith through the courtesy of that Society.

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[2] Chemist, Plastics Div., Monsanto Chemical Co.

[3] Assistant director of research, Plastics Div., Monsanto Chemical Co.

[4] "Creep properties of molded phenolic plastics," by D. Telfair, T. S. Carswell and H. K. Nason, MODERN PLASTICS *21*, 137 (Feb. 1944).

[5] "Mechanical strength of phenol-formaldehyde plastics," by A. Thum and H. R. Jacobi, Forsch. Gebiete Igenieurwesens Forschungsheft 396 (1939).

[6] "Phenol-formaldehyde plastics under conditions of bending fatigue," by D. Warburton Brown, Plastics (London) *6*, 210 (July 1942).

[7] "Behavior of plastics under repeated stress," by B. J. Lazan and A. Yorgiadis, A.S.T.M. Symposium on Plastics, Feb. 1944, p. 66; MODERN PLASTICS *21*, 119 (Aug. 1944).

Table I.—Molding Conditions for Test Specimens

Material	*Test*	*Molded form*	*Molding conditions*		
			Temp.	*Pressure*	*Time*
			° C.	*p.s.i.*	*min.*
Woodflour filled phenolic (A.S.T.M. D 700–43, Type 2)	Tensile creep and long time tensile strength	A.S.T.M. D 638–41 T, Type 1	165	4000	10
Asbestos filled phenolic (A.S.T.M. D 700–43 T, Type 10)	Tensile creep and long time tensile strength	A.S.T.M. D 638–41 T, Type 1	165	4000	10
Cellulose filled melamine (A.S.T.M. D 704–44 T, Type 1)	Tensile creep and long time tensile strength	A.S.T.M. D 638–41 T, Type 1	155	4000	7
Asbestos filled melamine (A.S.T.M. D 704–44 T, Type 2)	Tensile creep	A.S.T.M. D 638–41 T, Type 1	155	4000	10
Woodflour filled phenolic (A.S.T.M. D 700–43, Type 2)	Repeated flexural stress	5 by 7 by 0.25 in.	160	5400	15
Cellulose filled melamine (A.S.T.M. D 704–44 T, Type 1)	Repeated flexural stress	5 by 7 by 0.3 in.	160	5400	15

Type 1 tensile specimens compression molded. Molding conditions for all specimens are given in Table I.

The fatigue specimens were machined to size from 5 by 7 in. compression molded slabs in accordance with A.S.T.M. method D 671–42 T for unnotched specimens, and the machined surfaces smoothed with Crocus cloth. All specimens were conditioned in the test atmosphere, 77° F. and 50 percent R.H. (A.S.T.M. D 618), for two weeks prior to the start of the test program.

Apparatus

The apparatus used in conducting the creep and long time tensile strength studies on the phenolic and melamine materials has been described[4]. A heavy angle iron framework is used to support the specimens. The load is applied by the addition of the requisite number of lead weights (each weighing about 25 lb.) to a bucket suspended from the specimen. The strain in the creep tests (no strain measurements were taken for the long time tensile tests) is measured by an electrical resistance strain gage system.[8,9,10] Two gages are attached to a specimen, one on either side of the reduced section. This method of attaching the gages gives an average value for the strain. An unstressed (dummy) specimen with gages similarly attached is used as a balancing arm of the resistance bridge to eliminate the possibility of error due to temperature and humidity fluctuations and, to a certain extent, specimen shrinkage during the test period.

The repeated flexural stress (dynamic fatigue) tests were conducted on a "fixed cantilever type of testing machine designed to produce the same maximum deflection of the specimen in each cycle" (A.S.T.M. D 671–42 T). The load is applied by deflecting a spring steel dynamometer to which the fixed end of the specimen is attached, until the desired moment is applied to the specimen. The machine is driven by a constant speed electric motor which subjects the specimen to 1720 complete reversals of stress per minute. The tester is equipped with a revolution counter and a microswitch system for disconnecting the motor after failure of the specimen. An iron-constantan thermocouple, held in place at the test section with cellulose tape, and a portable potentiometer are used to follow the specimen temperature during testing.

Short time tensile strength (*Please turn to page 236*)

[8] "Stress strain relations in timber beams," by A. G. H. Dietz, A.S.T.M. Bulletin No. 118, 19 (Oct. 1942).
[9] "Some complexities of impact strength," by A. V. deForest, Metals Technology 8, No. 5 (Aug. 1941).
[10] Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa., and Ruge and deForest, consulting engineers, Cambridge, Mass.

Table II.—Long Time Tensile Strength of Several Plastics at 77° F. and 50 Percent Relative Humidity

Material	*Short time tensile strength (A.S.T.M. D 638–41 T)*	*Estimated limiting long time tensile strength*	*Percentage of short time strength*
	p.s.i.	*p.s.i.*	
A. Phenolic:[a]			
1. Cord filled	6000	2400–3000	45
2. Rag filled	6100	2400–3000	45
3. Woodflour filled	6100	2000–2500	36
4. Resin compound	8900	1600–2400	23
5. Asbestos filled	5700	1900–2300	37
6. Mica filled	5400	1600–2100	34
B. Melamine:			
1. Cellulose filled	7300	4800–5000	67
C. Methyl methacrylate[b]	8600[c]	3900	45
D. Laminates:[b]			
1. Phenolic, Grade XX	16,770[c]	11,000	67

[a] Data from "creep properties of molded phenolic plastics," by D. Telfair, T. S. Carswell and H. K. Nason, Modern Plastics 21, 137 (Feb. 1944).
[b] Data from "creep and time-fracture strength of plastics under tensile stresses," by B. Chasman, Modern Plastics 21, 145 (Feb. 1944).
[c] Tested according to Federal Specification L-P-406.

German thermosetting resins, Part II

This article describes German developments in extrusion molding of thermosetting resin compounds and four methods used in the mixing of phenolic molding materials. A rapid method for determining the proper curing time and temperature for batches of molding compounds is reported. The equipment employed is shown in photographs and sketches.

EXTRUSION of thermosetting materials,[1] Trolitan (phenolic) and Pollopas (urea), is done at Troisdorf in hydraulically operated 50-ton and 100-ton extrusion presses. These presses operate batchwise by the action of a ram compressing the material, charged in powder form, in a heated cylindrical chamber and extruding it through a heated extrusion die. In operation the material is charged automatically from a hopper in which it is mixed continuously by a stirrer operated by a flexible drive. From the hopper the material passes to the low temperature zone of the heating chamber. Here it is compressed by the ram which, in traveling forward, shuts the inlet from the hopper. The ram during the initial part of its travel is operated by low pressure water. As the material becomes plastic and additional pressure is required, there is an automatic switchover, by means of a slide valve, to high pressure hydraulic water. At the end of the extrusion stroke the hydraulic water is automatically cut off and the pressure ram is returned to the filling position by a large spring. This return to the filling position automatically opens the inlet to the hopper and filling recommences. The general layout of the extruder and filling device is shown in Fig. 1.

Two systems[2] are used for supporting core rods used for the extrusion of tubes. The first of these, which is the older method, employs a normal torpedo arrangement. In this, the central core rod is held at one end in the torpedo head and is centered at the other end by a cylindrical brass ring. This ring remains in position during the initial stages of the extrusion. As the extruded tube reaches the ring it pushes the ring out and the centering of the core rod is thereafter done by the already extruded tube. When using this method, flow lines corresponding to the openings in the torpedo head show on the finished tube.

The second design, which is newer, has a self centering device for the core rod. The core rod is rigidly fixed to the extruder at the pressure side and passes through a centering device located just after the filling chamber. The ram in this case has attached to it an angular piston which travels over the core rod up to the centering device. No circular brass ring is required; no flow marks are apparent on finished tubes.

The materials used for extrusion are the normal grades of woodflour filled phenolic molding material (Trolitan type 31) and the pulp filled urea molding material (Pollopas). The only special feature in the phenolic material is that the resin used must have as high a viscosity as possible. The resin[3] actually employed is the novolak, T4, run to a final viscosity of 200 to 240 centipoises. If resins of lower viscosity are employed, the molding materials are soft and tend to stick to the walls of the extruder chamber and cure there. Another difficulty with soft materials is that they evolve a considerable volume of vapor, mostly steam, which exerts an additional pressure in the extrusion die and may force out uncured material. Trolitan type 51, made from thick sheet paper,[4] has been tried in the extrusion press but while it extrudes perfectly satisfactorily, it is difficult to feed owing to its bulkiness.

Pollopas, intended for extrusion, has an additional 0.15 percent I.G. wax O.P. (1:3 butylene glycol esterified with montan acids to acid number 60 and neutralized by lime to acid number 20) added during ball milling. During drying the material is run to a stiff cup flow. Stiff flow and complete freedom from moisture are the main requirements.

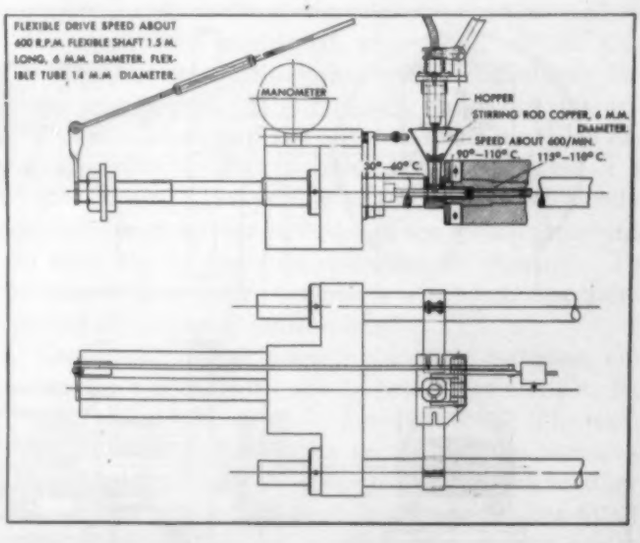
The tools used for extruding both phenolic and urea materials must be chromium plated. They are normally made of V2A steel. The dies for forming the out-

[1] "Investigation of German plastics plants. Part 4," by J. W. C. Crawford and T. Love, PB 34032.

[2] Detailed drawings of the two systems are given in the reference cited in footnote 1.

[3] "German manufacture of phenolic resins for molding and laminating," MODERN PLASTICS 23, 155 (Aug. 1946).

[4] "Manufacture of phenolic molding compounds in Germany," MODERN PLASTICS 24, 160 (Sept. 1946).



1—*Layout of extruder and filling device for thermosetting materials at Dynamit A. G., Troisdorf*

side diameter of tubes can be used for the extrusion of up to 100,000 meters before being replaced. They are then accurately ground to a larger size and replated. More wear takes place on the core rods which require replacing after extruding 30,000 to 40,000 meters. The core rods are slightly tapered (0.1 mm. less at the take-off end) and have been successfully made in spring steel up to 1.0 mm. diameter. The heating cylinder is made of chrome-nickel steel which will withstand a pressure up to 120 kg./mm.[2] The hydraulic pressure varies from 60 to 200 atmospheres but never exceeds 200 atmospheres. There are three different heating zones, the temperatures of which are different depending on whether urea or phenolic material is being extruded. Two of these zones are steam heated and the third, the extrusion head, is heated electrically. The temperatures used are:

	Zone 1	Zone 2	Zone 3
Trolitan	30–60° C.	90–100° C.	165–170° C.
Pollopas	80–90° C.	80–90° C.	140–145° C.

Before commencing extrusion, a small quantity of the material is mixed with 0.2 percent magnesium stearate to serve as an additional lubricant. The extrusion die and core rod are lubricated with vaseline. The reason for this additional lubrication is that initially all the available heat is supplied to the material which therefore tends to cure too fast. For this reason it is essential that the first few meters should extrude as easily as possible. Thereafter the extruded material removes heat as it is extruded and additional lubrication is not necessary. The first few meters of extruded tube or section are discarded. The rate of extrusion depends on wall thickness:

0.75–1.2 mm. thickness.....12 meters per hr.
2 mm. thickness..... 8 meters per hr.

The output of extruded parts at Troisdorf was 1500 to 2000 kg. per month, approximately equal amounts of Pollopas and Trolitan. Pollopas tubes were produced for Allgemeine Elektrizitäts-Gesellschaft, Berlin, for use as circuit breakers. These had an external diameter of 28 mm. and an internal diameter of 21 mm.; the extrusion rate was 4 meters per hour. Such tubes will stand a water pressure of 120 atmospheres and a voltage of 10,000.

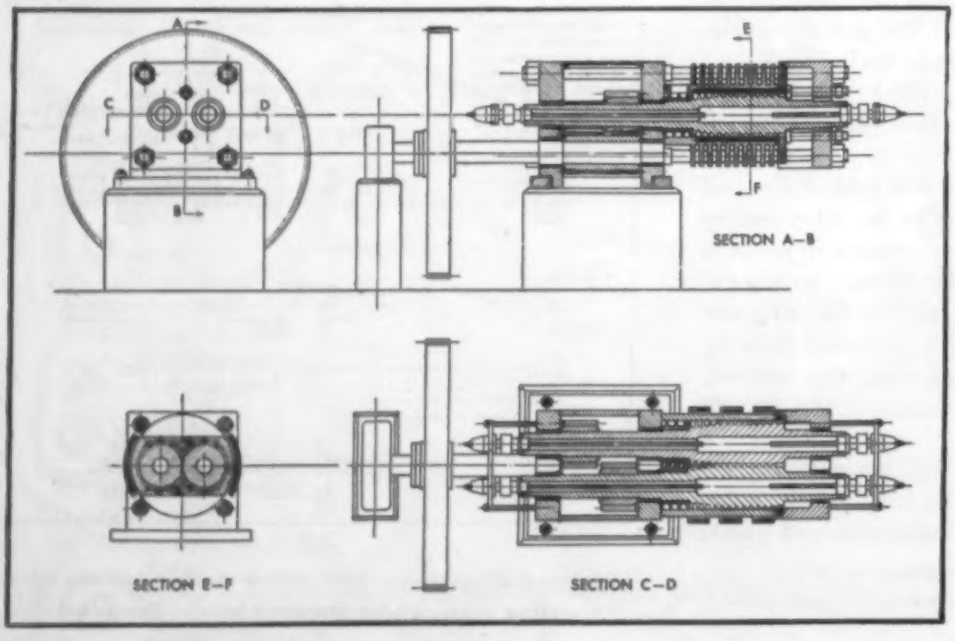
Preparation of molding materials

Extrusion mixing[1]—Dynamit A.G., Troisdorf, have experimented with the use of an extruder mixer for manufacturing phenolic molding materials. The method used was devised by Nowack A. G., Berlin-Bautzen, which has operated a similar process successfully. The general layout of the apparatus used is shown in Fig. 2. It is a twin screw extruder in which the pitch of the screws[3] varies from the inlet to the extrusion end. The screws are both driven through back gears from the same main driving shaft. The mixing chamber is provided with external fins, top and bottom, and electrical heating elements at the sides. The screws themselves are cored for water cooling.

In operation the mixed resin, filler, etc., is fed into the machine, becomes plastic by the combined action of the working and the heat applied, and is thus mixed and extruded as the finished molding material by the action of the screws. No heat need be supplied once the apparatus has been started up.

The apparatus used at Troisdorf was not satisfactory because there was not sufficient control on the temperature. Heat produced by the working of the plastic mass could not be dissipated quickly enough from the walls of the mixing chamber or from the surface of the screw. The latter is apparently the greater problem, as with the present design the cooling is not sufficiently effective on the surface. Accordingly, the material being processed cures out on the screw and on walls of chamber, ultimately stopping apparatus.

[3] A detailed drawing of the screw is given in the reference cited in footnote 1.

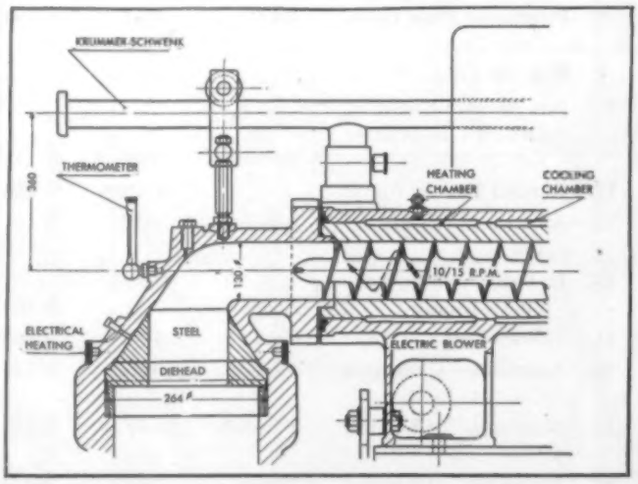


2—A drawing of an extrusion mixer for producing phenolic molding materials at Dynamit A. G. Troisdorf. It is a screw type press used in the manufacture of Trolitan

3—Continuous automatic rolling of phenolic molding compounds is accomplished in this machine. Materials are fed into rolls at center and cut off at each side, falling on conveyor belts which carry compound to the grinding, blending, packaging units

An alteration in design is contemplated to make the screw in sections which can be mounted on a central shaft and held in position by keys and a retaining lock nut at the end of the assembly. Each section will be cored for water cooling. It is expected that this will give greater control of the surface temperature of the screw since the cores for water cooling are much nearer the surface. The new design will also have the advantage of enabling experiments to be conducted on variations of screw pitch and depth without the expense of producing entire screws of different design. These improvements have not yet been tried and are only in the drawing board stage.

This process has been tried by Bisterfeld and Stolting, Radevormwald, but they consider that mixing done only in an extruder is incomplete and that for the production of a satisfactory molding material processing on mixing rolls is essential to give thorough mixing and densification. In the Bisterfeld and Stolting process, which is still only in the experimental stage, the extruder is used merely as a premixer before the material passes to mixing rolls for final processing. Two extruders have been used. The first extruder was a small machine with an output of 300 kg./hr. and the second (shown diagramatically in Fig. 4) had an output of 650 kg./hr. The screw chamber on the larger machine has an internal diameter of 130 mm. and an external diameter of about 260 mm. In the jacket there are two cored zones, one for heating (steam) and the other for cooling water. The premixed resin, filler, etc., are fed into the extrusion chamber and forced by a screw, revolving at 10 to 15 r.p.m., through an electrically heated fluted cone-shaped extrusion head. The temperatures used depend on the material being processed. The heating chamber is normally 80 to 100° C., and the die head can be heated to 140° C. After starting the extruder, very little heating is required; so much frictional heat is generated that it becomes more a question of cooling rather than of heating. The material issues from the die head in the form of rods which are cut off and finished by rolling on normal mixing rolls.



4—A cross-section of the Schneckenpresse extrusion press made for Bisterfeld and Stolting

The chief difficulty encountered with this process was the control of temperature. The frictional heat was so great and heat dissipation was so poor that the material on the walls of the extrusion chamber and on the screw was overheated and cured. When this happened, power consumption rose and eventually the machine jammed. It is hoped to overcome this difficulty by redesigning the screw to make provision for water cooling. Other troubles experienced were of a minor nature. The driving motor was not sufficiently powerful and neither extruder had a sufficient output to keep the mixing rolls operating to capacity. To overcome these latter troubles a larger extruder more powerfully driven is contemplated.

Continuous rolling process[6]—Molding materials are made by a continuous rolling process at the Dr. K. Raschig G.m.b.H. plant in Ludwigshafen. The resin and hexamethylenetetramine are ground in a hammer-type grinder. These are mixed with the filler and other ingredients of the compound in a large blender fitted with a horizontal stirrer (stirring arms at right angles to driving shaft). The (*Please turn to page 248*)

[6] "Investigation of German plastics plants. Part 1," by G. M. Kline, J. H. Rooney, J. W. C. Crawford, T. Love and F. J. Curtis, PB 949.

Spectral transmission of transparent plastics

by R. B. RICE, E. F. FIEDLER and J. J. PYLE*

THE continuous development of new and better transparent plastics has given considerable impetus to their application in the optical field. The fact that the spectral transmission characteristics of plastics may differ considerably from those of the time-honored transparent material, glass, has stimulated an active interest in the development of entirely new applications for these materials in which their transmission properties or their absorption properties in the near ultraviolet and infrared may have functional value.

Recently the Pittsfield laboratory of General Electric Co. took some measurements of the transmission of some of its own products and the results were of such interest that the study was extended to cover other commercially available transparent plastics. The curves are being reproduced here with the thought that others may find the accumulation and comparison of such transmission figures of value and interest, since comparative data of this type are not readily found in the literature.[1]

Spectrophotometer used

The spectral region from 220 to 1300 millimicrons (2200 to 13,000 Å) was covered, using a Beckman quartz spectrophotometer. Calibration was verified before making the measurements. The curves reproduced herewith include only the ranges of 270 to 560 mμ and 1100 to 1300 mμ, since between these ranges all curves were essentially horizontal, and from 220 to 260 mμ no sample exhibited measurable transmission. The specimens were prepared in nearly all cases by compression molding or by casting a small plate 1¼ by 1⅛ by approximately 0.150 in. thick, using commercially obtainable material. Where sheet stock was available it was used.

Transmission comparisons

Table I identifies the plastics tested and lists the thickness of the specimens, the data for which have been plotted as read and have not been converted to a standard thickness. Since most of the materials fell between 0.130 and 0.150 in. in thickness, transmission comparisons may be made without serious error. Figure 1 shows the near ultraviolet transmission of all the specimens. The curves for the near infrared are shown in Figs. 2 and 3 to minimize confusion in reading. These latter curves exhibit certain characteristics which may in many cases assist in rapidly identifying an unknown plastic material. However, such identification of an unknown plastic was not the original objective of the study.

* Plastics Div., Chemical Dept., General Electric Co., Pittsfield, Mass.

[1] For a recent survey, see the 1947 MODERN PLASTICS ENCYCLOPEDIA, pp. 755–758.

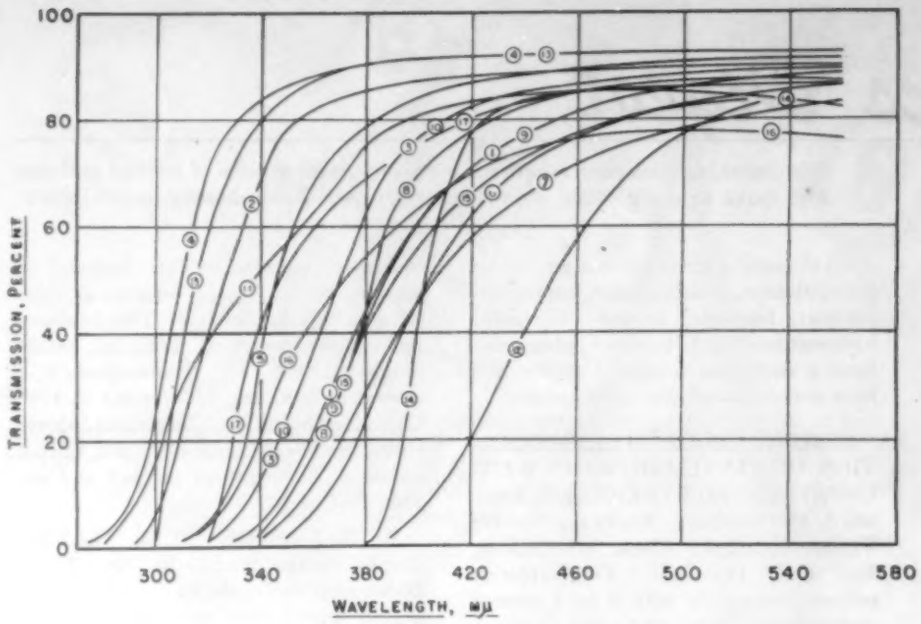
Acknowledgment

The authors wish to express their appreciation to Miss D. M. Harriman for her assistance in making transmission measurements and to Mr. John Proctor for preparing many of the specimens used. Appreciation is also extended to those manufacturers of various types of plastics materials who supplied samples for this work.

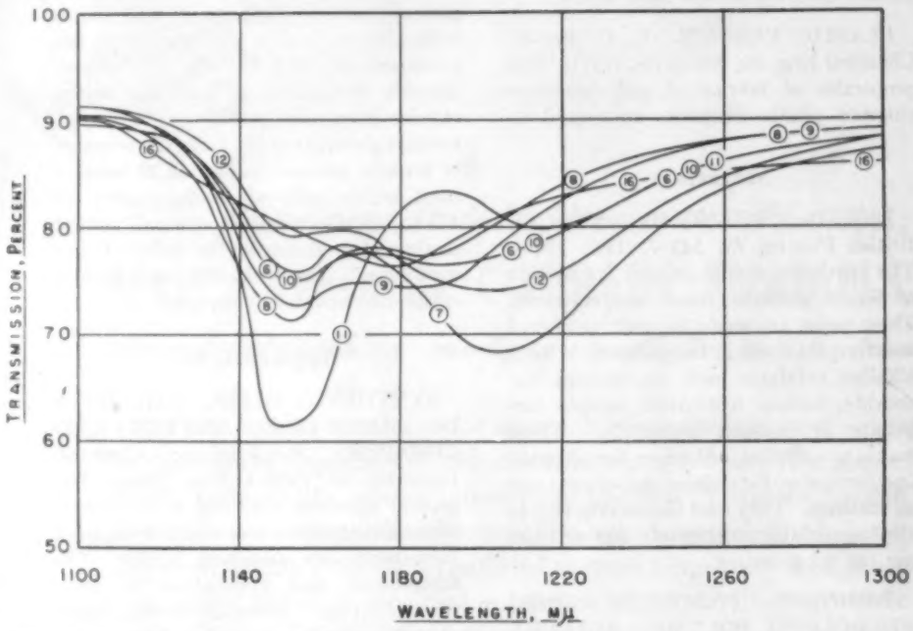
Table I.—Description of Materials Investigated

Sample no.	*Manufacturer*	*Trade name*	*Identification*	*Thickness*
				in.
1.	B. F. Goodrich Chem. Co.	Kriston	A-1	0.130
2.	Dow Chemical Co.	Styron	411A-1-K-27	0.135
3.	General Electric Co.	...	1421	0.118
4.	Rohm and Haas Co.	Plexiglas	...	0.129
5.	Columbia Chemical Div., Pittsburgh Plate Glass Co.	...	CR-39	0.139
6.	Marco Chemicals, Inc.	...	FN-427-Cl.7	0.145
7.	General Electric Co.	Permafil	ZV-3713	0.143
8.	Pittsburgh Plate Glass Co.	Selectron	5003	0.150
9.	Bakelite Corp.	...	16631	0.155
10.	Naugatuck Chemical Div., U. S. Rubber Co.	Vibron	103	0.152
11.	General Electric Co.	...	R-300*	0.150
12.	American Cyanamid Co.	Laminac	4122	0.145
13.	E. I. du Pont de Nemours & Co., Inc.	Lucite	...	0.135
14.	Catalin Corp.	Catavar	1001	0.149
15.	American Cyanamid Co.	Laminac	4116	0.146
16.	Monsanto Chemical Co.	Fibestos	2065FJF	0.143
17.	Monsanto Chemical Co.	Nitron	205D	0.147

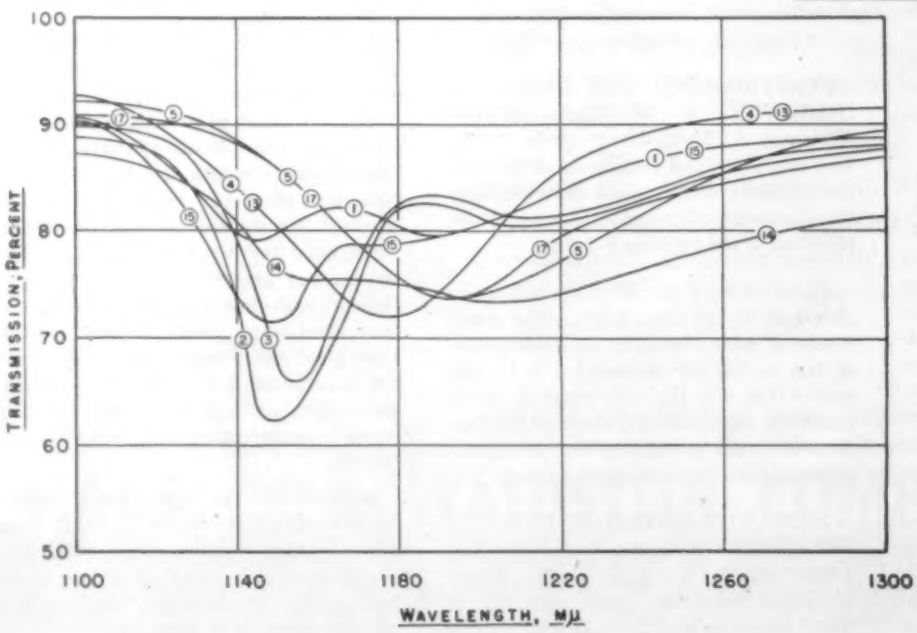
* Not yet available in quantity.



1—Chart of the near ultraviolet transmission of all transparent plastics which were subjected to the test



2—Chart of near infrared transmission of transparent plastics which were subjected to test



3—A second chart of near infrared transmission of transparent plastics undergoing test

Plastics Digest

This digest includes each month the more important articles of interest to those who make or use plastics. Mail request for periodicals directly to publishers.

General

OUTLOOK FOR '47. Modern Packaging *20*, 87–96 (Jan. 1947). The outlook in 1947 regarding packaging and materials used in packaging is discussed. Paper, boxboard, metals, glass, plastics, machinery, adhesives, textiles, cellophane, wood, pottery and rubber are considered. Predictions regarding the market for the various materials are made.

PLASTICS AND SYNTHETIC RESINS. Chemical Eng. *54*, 118 (Feb. 1947). Production and supply in the plastics industry are discussed briefly.

PLASTIC FABRICS. E. C. Fetter. Chemical Eng. *54*, 129 (Feb. 1947). The properties of fabrics of polyvinylidene chloride plastic filaments are described.

Materials

LIQUID PHENOLIC RESINS. British Plastics *18*, 543–7 (Dec. 1946). The synthesis, properties and application of liquid phenolic resins are reviewed. These resins are made by reacting phenol and formaldehyde in the presence of fixed alkaline catalysts such as calcium hydroxide, barium hydroxide, sodium carbonate or sodium hydroxide. These resins are used as adhesives for plywood and laminates, for making cast objects and as coatings. They lend themselves well to the bag molding techniques. Jigs and dies are made by casting.

RESINOUS PRODUCTS FROM PETROLEUM POLYMER SULFURIZATION. M. G. Mayberry, P. V. McKinney and H. E. Westlake, Jr. Ind. Eng. Chem. *39*, 166–7 (Jan. 1947). Dark mastic-like polymers are prepared from petroleum products and sulfur.

PREPARATION AND POLYMERIZATION OF VINYL FLUORIDE. A. E. Newkirk. J. Am. Chem. Soc. *68*, 2467–71 (Dec. 1946). Vinyl fluoride is prepared in good yields by passing an equimolar mixture of hydrogen fluoride and acetylene at 100° C. over carbon pellets impregnated with a mixture of mercury (II) chloride and barium chloride. Vinyl fluoride polymerizes on exposure to ultraviolet light at 27° C. and by the use of peroxide catalysts. Vinyl fluoride copolymerizes with vinyl acetate, methyl methacrylate and vinyl chloride. The polyvinyl fluorides produced soften at 170° C. and become fluid at 190° C., burn in a gas flame, have a density of 1.30 at 25° C., are not soluble in organic solvents at room temperature but are soluble in hot dioxane, cyclohexanone, isophorone, phorone, fenchone, several chlorinated hydrocarbons and tricresyl phosphate, have a molecular weight of 23,000 and have a mostly crystalline arrangement.

SIMULTANEOUS POLYMERIZATION OF VINYL CHLORIDE WITH UNSATURATED ETHERS. I. P. Losev and S. M. Zhivukhin. Trudy Konferentsii Vysokomolekulyar; Chem. Abstracts *40*, 3719 (July 10, 1946). Vinyl chloride polymerizes readily with 2 to 4 percent dipropylene ether at 40 to 60° C. in the presence of benzoyl peroxide and boron trifluoride to form a polymer which decomposes at 199° C. Pure polyvinyl chloride decomposes at 146° C. Vinyl chloride polymerizes with 0.1 to 10 percent trivinyl glyceride at 50° C. in the presence of benzoyl peroxide to form in 20 hours a hard brittle solid which decomposes at 174 to 200° C. Vinyl chloride and methyl methacrylate copolymerize under similar conditions. Vinyl chloride and divinyl sulfide do not form copolymers.

Applications

SYNTHETIC RESIN ADHESIVES DO MANY JOBS BETTER AND CHEAPER. A. Frieden. Chemical Industries *59*, 1002–4 (Dec. 1946). The general chemical reactions to synthesize resins for adhesives and the techniques of formulation are described briefly. The formulation and application of urea-formaldehyde, melamine-formaldehyde, phenolic, vinyl, cellulose derivative and other plastics in adhesives are reviewed.

PLASTICS AND THE BUILDING INDUSTRY. G. M. Kline. Plastics (Chicago) *6*, 30–2, 88–90 (Feb. 1947). The properties and techniques of fabrication of plastic materials are discussed from the viewpoint of actual and possible application in the building industry.

PLASTICS FOR BUSES. Plastics (London) *11*, 26 (Jan. 1947). The possibilities of using plastics in the construction of bus bodies are discussed. It is concluded that with the wide range of plastic materials available, the possible applications embrace practically everything except the main load-carrying structure.

NEW COMMUTATOR BAR INSULATION. E. L. Schulman. Westinghouse Eng. *7*, 61–3 (Mar. 1947). Asbestos-paper laminates made with alkyd-vinyl resins are used to make commutator insulation material. This material is superior to and more economical than mica in this application. This laminate has a shear strength of 390 p.s.i., tensile strength 15,000 p.s.i., oil absorption 0.14 percent at 25 °C. and 0.85 percent at 110° C., water absorption 1.71 percent, short-time dielectric strength 400 v/mil, surface resistance 30 megohms per in.^{2} and arc resistance of 185 seconds.

BULLET-PROOF FUEL TANKS. British Plastics *18*, 509–10 (Nov. 1946). Bullet-proof fuel tanks for aircraft made of flexible plastic fuel cells are described. The basic resin used is polyvinyl formal.

Coatings

VISCOSITY OF CELLULOSE DERIVATIVES AND RESINS IN MIXED SOLVENTS. S. R. Palit. Paint, Oil Chem. Rev. *109*, No. 14, 15, 16, 18, 43 (1946). The viscosity of various solutions of cellulose derivatives and resins are reviewed. Fifty-two references.

CELLULOSE ESTER MELT-COATING COMPOSITIONS. C. J. Malm, M. Salo and H. F. Vivian. Ind. Eng. Chem. *39*, 168–74 (Feb. 1947). The melt-coating properties of compositions containing high-butyryl cellulose acetate butyrate were studied. Essentially fully esterified cellulose acetate butyrates, with a butyryl content above 47 percent and an intrinsic viscosity of about 0.9 in acetone, were found suitable as basic components in melt formulations. The physical properties of typical cellulose acetate butyrate melt formulations containing plasticizers, resins and waxes are described in detail. The data include the effect of temperature and plasticizer concentration on melt viscosity, the effect of plasticizer variations on melting point, tensile strength, elongation, impact strength, blocking temperature, and plasticizer retention, and the effect of the incorporation of resins and waxes on water vapor permeability. The outstanding properties of these formulations are high gloss, high blocking temperature, good water resistance and in some cases good water vapor resistance. Data are also presented which illustrate the properties imparted to several types of paper by melt coating with typical formulations.

RUBBERS TO AID OF PAINTS AND PLASTICS. W. H. Stevens. Plastics (London) *11*, 22–4 (Jan. 1947). The use of chemically-modified rubbers in the formulation of protective coatings and of floor coverings is discussed.

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Engineering

HIGH-FREQUENCY HEATING OF NONCONDUCTING MATERIALS. F. J. Jolly. Trans. A.S.M.E. *69*, 155–62 (Feb. 1947). High-frequency dielectric heating provides a unique method of heating certain materials with results which are unattainable with conventional means. The limitations of former methods and the advantages of high-frequency heating are discussed, and the theoretical basis and the practical limitations of the latter method are explained. Its applications in various industries and the advantages gained are briefly discussed, followed by some of the possible future applications.

HIGH STANDARDS HOLD FOR PLASTICS IN CARS. N. J. Rakas. SAE J. *55*, 83, 85 (Feb. 1947). This is a digest of a paper presented at the S.A.E. Detroit meeting in October 1946. Tests and requirements for plastics for steering wheels, instrument dials and insulation materials are discussed.

GERMAN USES AND PROCESSING OF P.V.C. British Plastics *19*, 40–3 (Jan. 1947). The properties, fabrication and uses of unplasticized and plasticized polyvinyl chloride are discussed. The information is taken from reports of investigations of German industry.

SILVERING OF PLASTICS. H. Narcus. Metal Finishing *44*, 240–2 (1946). The various methods for applying films of silver metal on plastics are reviewed. Sixteen references.

Chemistry

EFFECT OF OXYGEN ON EMULSION POLYMERIZATION OF STYRENE. I. M. Kolthoff and W. J. Dale. J. Am. Chem. Soc. *69*, 441–6 (Feb. 1947). The induction period caused by oxygen in the emulsion polymerization of styrene using persulfate as "catalyst" is inversely proportional to the persulfate concentration, and, provided that the initial partial pressure of oxygen is constant, the induction period is found proportional to the amount of oxygen. Under these conditions the disappearance of oxygen is determined by the rate of activation of styrene molecules, which is proportional to the concentration of persulfate. It is established that under the experimental conditions, the disappearance of oxygen is not a zero order reaction when the initial pressure of oxygen is varied. The length of the induction period is hardly dependent upon the amount of soap in the charge. This indicates that during the induction period mainly styrene molecules dissolved in the "pure" water are being activated by persulfate and that the styrene solubilized in the soap miscelles plays a subordinate part in the reaction during the induction period. The rate of polymerization is proportional to the square root of the amount of soap in the recipe.

MOLECULAR WEIGHT DISTRIBUTIONS IN POLYMETHYL METHACRYLATES. J. H. Baxendale, S. Bywater and M. G. Evans. Trans. Faraday Soc. *42*, 675–84 (Nov. 1946). The distribution function of the molecular weight of polymers produced in aqueous solution is derived from the kinetics of the polymerization reactions. Comparison between the theoretical distribution and that obtained by fractionation of the polymers is satisfactory. The theory predicts the correct values for the viscosity, molecular weight and its variations, a) with initiator concentrations and b) during the course of reaction.

Properties

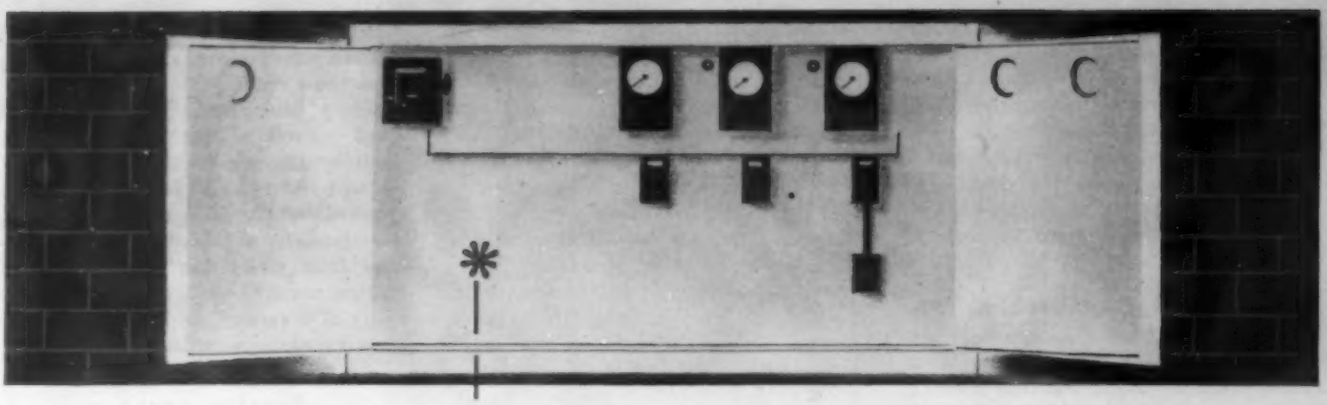
RESISTANCE OF PLASTICS TO SLOW AND REPEATED FORCES. R. L'Hermite. Plastiques *1*, 4–8 (1943). A machine for applying loads at constant deformation speed to materials is described. With constant elongation at break, the ultimate tensile strength varies considerably with the rate of deformation; for a phenolic plastic at a rate of deformation of 0.1 percent per day the tensile strength is 3.68 kg/mm² whereas for a rate of deformation of 1 percent per minute the tensile strength is 5.50 kg/mm². The results of fatigue tests are also discussed. Data obtained with several phenolics in these tests are reported.

DIELECTRIC PROPERTIES OF PHENOLIC RESINS AND MOLDED COMPOSITIONS. L. M. Debing. Trans. Electrochem. Soc. *90*, 24 pp. (1946). The dielectric constants and power factors of pure and modified phenol-formaldehyde resins were determined over the frequency range of 1000 to 45,000,000 cycles. The dielectric constants of both cured and uncured resins decrease gradually with an increase in frequency. Curing the resins reduces the dielectric constant about 9 percent over the entire range. The power factors are increased at low frequencies and decreased at high frequencies by curing the resins with hexamethylenetetramine. The power factor and dielectric constant are reduced markedly by substituting an alkyl or aryl group in the methylene bridge or in the para position of the phenol and by the benzylation of the hydroxyl group.

CALORIMETRIC STUDY OF THE GELATINIZATION OF NITROCELLULOSES BY ALCOHOL-ETHER MIXTURES. E. Calvet and G. Sébille. Compt. rend. 222, 84–5 (1946); Chem. Abstracts *40*, 4284–5 (Aug. 10, 1946). The heats of absorption per glucose unit for cellulose nitrate of 14 percent nitrogen content and ethanol is 1300 cal. and for cellulose nitrate of 11.5 percent nitrogen content 1800 cal. The corresponding values for diethyl ether are 2500 and 3370 cal., respectively. The heats of absorption of various mixtures of alcohol and ether with cellulose nitrate are reported.

PLASTIC FLOW. C. Mack. J. Applied Phys. *17*, 1086–92 (Dec. 1946). Plastic substances are considered to be composed of units of flow with various yield values. In this case the product of the strain rate and viscosity is equal to the sum of the differences between the applied stress and the yield values. This relationship can be applied to any plastic system free of elastic after-effect and expresses their mechanical properties in terms of a coefficient of viscosity which is independent of the stress applied. With the proper choice of the distribution of yield values any kind of relation between stress and strain rate can be established. This relationship is applied to plastic flow which is defined as a deformation mechanism having a curvilinear relationship between stress and rate of deformation and a constant rate of deformation at constant stress. Equations are given for the coefficient of viscosity of such systems and for the relaxation of stress at constant deformation as a function of time.

CREEP. C. Mack. J. Applied Phys. *17*, 1093–1100 (Dec. 1946). Creep is defined as a mechanism of deformation for systems which have a curvilinear relationship between strain and time at constant stress. Creep is connected with changes in the internal structure of a plastic substance and results in an increase in strength of such materials through work-hardening. Equations are derived which give the stress as a function of strain rate and time (time-hardening), as a function of strain rate and strain (strain-hardening) and as a function of strain rate, strain, and time. The difference between time-hardening and strain-hardening is dis-



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cussed. Expressions are given for the coefficients of viscosity of such systems which are independent of the stress applied. The relaxation of stress at constant strain is discussed, and it is shown that the stress relaxation depends upon the history of the substance under test. The concept of creep is also applied to thixotropic systems which are considered as cases of work-softening.

CREEP AND ELASTIC AFTER-EFFECT. C. Mack. J. Applied Phys. *17*, 1101–7 (Dec. 1946). A large number of substances show the phenomenon of elastic after-effect, and part of their deformation recovers on unloading as a function of time. This portion of the deformation at constant stress has a strain rate which decreases with time and is therefore comparable to creep. Expressions are given for the strain-time relationships of such systems and the process of stress relaxation at constant strain is discussed. The equations given in connection with plastic flow, creep due to work-hardening, thixotropy, and creep in combination with elastic after-effect are applied to data given in the literature, and it is also shown that these equations suffice to describe the deformation and relaxation mechanisms of a variety of materials such as metals, clay soil, food products, acrylic acid polymer, polyvinyl chloride, cellulose acetate, manila ropes, paper laminates, phenolic molding compounds, rubber, asphalt and bituminous pavements.

RELATIONSHIP BETWEEN THE MOISTURE CONTENT OF FIBROUS MATERIALS AND THE RELATIVE ATMOSPHERIC HUMIDITY IN ABSORPTION AND DESORPTION. HYSTERESIS OF SWELLING. H. Koch. Schweiz. Arch. angew. Wiss. Tech. *12*, 176–84 (June 1946). A formula is derived for the relationship between the relative humidity and the moisture content of fibrous materials such as cotton, rayon and casein. The S-shaped moisture-humidity curves are characteristic for all vegetable and animal fibers. A method for determining the point of inflexion of these curves and the maximum hysteresis value is given.

Testing

ANALYTICAL IDENTIFICATION OF NITROGEN-CONTAINING SYNTHETIC RESINS. C. P. A. Kappelmeier and W. R. van Goor. Paint Tech. *11*, No. 121, 7–16 (1946). Chemical methods for identifying synthetic resins containing nitrogen are described.

DETERMINATION OF DEGREE OF SUBSTITUTION OF SODIUM CARBOXYMETHYLCELLULOSE. R. W. Eyler, E. D. Klug and F. Diephuis. Analytical Chem. *19*, 24–7 (Jan. 1947). Three methods are described for determining the degree of substitution of sodium carboxymethylcellulose. This material may be converted to its free acid form by treatment with acidified alcohol, freed from excess acid, and the carboxyl content determined by an acidimetric procedure using phenolphthalein indicator. Alternatively, the sodium salt may be dissolved in water containing excess sodium hydroxide, and the solution titrated conductometrically with standard hydrochloric acid solution. In the analysis of purified, dry samples, the use of this latter method results in a considerable saving in time over that required in the former. A third method involving treatment of the carboxymethylcellulose with sulfuric acid to produce glycolic acid, which is then determined colorimetrically using 2,7–dihydroxynaphthalene, is recommended for use with difficultly soluble samples. Possible use of this method in quantitative determination of carboxymethylcellulose in mixtures is suggested. The three methods give comparable results when applied to samples having a degree of substitution ranging from 0.2 to 1.3. The most advantageous application of each method is suggested.

ADHESIVITY AND ITS MEASUREMENT. B. Persoz. Peintures, pigments, vernis *21*, 162–9 (1945); Chem. Abstracts *40*, 5932 (Oct. 10, 1946). The measurement of adhesivity is described and various factors affecting it are discussed.

TEXTILE TESTING IN GERMANY. H. F. Schiefer, L. Fourt and R. T. Kropf. ASTM Bulletin *1947*, No. 144, 17–25 (Jan. 1947). Various instruments used in the physical testing of textile materials in Germany are described. Some of these, such as tensile testing and abrasion testing, are of interest in the testing of plastic filaments.

PACKAGING INSTITUTE STANDARD DROP TEST. Modern Packaging *20*, 144 (Feb. 1947). A drop test for determining the impact resistance of sheet materials is described.

MOISTURE EQUILIBRIUM. W. A. Funk. Modern Packaging *20*, 135–8, 162, 164 (Feb. 1947). A laboratory method for rapidly determining humidity characteristics of materials is described. Sorption isotherms are used to find the relationship between moisture level and equilibrium relative humidity.

A CAPILLARY-TYPE VISCOMETER. D. P. Shoemaker, E. Hoerger, R. M. Noyes and R. H. Blaker. Analytical Chem. *19*, 131–2 (Feb. 1947). A capillary-type viscometer for the study of solutions containing volatile solvents has been designed and tested. Because the solution need not be transferred from the container in which it is prepared, measurements made with this viscometer on concentrated solutions of large molecules, such as those of cellulose nitrates, involatile solvents are more reproducible than those made with an Ostwald-type capillary viscometer. Because of the small volume of the new viscometer, viscosity determinations may be carried out with much smaller samples than those required by the falling ball viscometer. The simplicity of this device and its freedom from errors due to concentration changes recommend its application to the study of a variety of substances in solutions containing volatile solvents.

Synthetic rubber

STUDY OF STRUCTURE OF BUTADIENE POLYMERS BY MEANS OF OZONOLYSIS. N. Rabjohn, C. E. Bryan, G. E. Inskeep, H. W. Johnson and J. K. Lawson. J. Am. Chem. Soc. *69*, 314–19 (Feb. 1947). Two samples of the GR–S copolymer of butadiene and styrene were degraded by means of ozonolysis. A number of fragments were isolated and identified so that an approximate idea of the structures of the copolymers was obtained. A series of butadiene copolymers was treated with ozone in an attempt to determine the extent to which the butadiene had polymerized by 1,2-addition in contrast to 1,4-addition. Although the analytical procedure employed afforded only relative values, referred to as "ozonization numbers," the results indicate that the manner in which the butadiene molecule enters the growing copolymer chain is not greatly influenced by experimental conditions.

NATURE OF THE REACTION BETWEEN SULFUR AND OLEFINS. E. H. Farmer and F. W. Shipley. J. Polymer Sci. *1*, 293–304 (Aug. 1946). Whatever additional factors may be concerned in the production of good vulcanizates from natural rubber by the action of sulfur, there is no doubt that the action of sulfur on olefinic materials in general at the ordinary vulcanization temperature is a chemical one, the primary course of which is determined largely by the constitution of the olefin, and hence may be profitably studied by experimentation with olefins of different unsaturation patterns. Unaccelerated reaction between sulfur and simple monoölefins leads almost exclusively to cross linking of the separate olefin molecules, mostly in pairs, by groups of sulfur atoms. When, however, two or more olefinic units occur in the same molecule, as in the diisoprenic hydrocarbons, intramolecular cross linking, i.e., cyclization, at once becomes possible, and the result of sulfur action consists partly in the cross linking of separate molecules as with the monoölefins, but largely in cyclization of the individual olefinic chains, thereby forming sulfur-containing rings. These changes entail a certain loss of unsaturation, from which deductions can be made as to the mechanism of the reaction.

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U. S. Plastics Patents

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 25 cents each.

EMULSIONS. I. L. Griffin, D. E. Truax and N. H. Nuttall (to Stein, Hall and Co., Inc.). U. S. 2,413,320, Dec. 31. A film-forming emulsion comprising a water-immiscible phase and an aqueous phase, the latter containing a water-dispersible polyhydroxylated film-forming substance capable of being converted to a water-insoluble film by drying in the presence of an antimony compound which reduces the solubility of the polyhydroxylated substance when dried in association.

CONTAINER. G. S. Hills. U. S. 2,413,323, Dec. 31. A collapsible container for pastes formed from a water-resistant thermoplastic flexible resin containing a plasticizer.

RESINOUS MATERIALS. F. W. Kressman and F. W. Kressman, Jr. (one half to Continental Turpentine and Rosin Corp., Inc.). U. S. 2,413,326, Dec. 31. A resinous plastic material is formed by heating a body of rosin to a temperature in the range 450-550° F., introducing a solid lignocellulosic material, agitating and heating to a reaction temperature of 600° F. until the entire mass has liquefied.

INJECTION DEVICE. D. C. Youngblood and B. D. Ashbaugh (to Hydraulic Development Corp., Inc.). U. S. 2,413,401, Dec. 31. An apparatus for feeding preforms to injection molding machines.

OIL-MODIFIED RESINS. A. P. Maxxucchelli (to Bakelite Corp.). U. S. 2,413,412, Dec. 31. A process for preparing an oil-modified resinous composition comprising reacting at a temperature between 115 and 215° C. a dehydrated novolak phenol-aldehyde resin with a fatty material such as raw fatty oils, oxidized fatty oils, heat polymerized fatty oils, dehydrated fatty oils, hydrogenated fatty oils or fatty acids in the presence of an acidic catalyst such as a hydrate of phosphorus pentoxide, dialkyl sulfates, or sulfur trioxide in an amount between 0.1 and 4.0 percent by weight of the resin.

ALLYL STARCH. P. L. Nichols, Jr., P. E. Meiss and E. Yanovsky (to U. S. Government). U. S. 2,413,463, Dec. 31. Organic solvent soluble allyl starch is prepared by allylating starch in the presence of concentrated alkaline solution and an organic solvent.

MOLDING PROCESS. J. W. Hill (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,413,498, Dec. 31. Shaped articles are prepared from tetrafluoroethylene polymer by mixing with another organic film-forming material which decomposes at a temperature between 350 and 500° C., said material being present in an amount between 10 and 75 percent, forming the mixture and heating between 350 and 500° C. until the polymer coalesces.

BRACELET. H. D. Brady. U. S. 2,413,541, Dec. 31. An article of jewelry comprising a bracelet of resilient transparent plastic material.

ABRASIVE PAD. L. H. Englund (to J. H. Rhodes and Co.). U. S. 2,413,551, Dec. 31. An abrasive pad is prepared by casting molten plastic filaments onto a reciprocating member to provide a fibrous mass of interlocked threads to be formed into pads and dispersing abrasive throughout the mass to coat the filaments and impregnate the pad before mass has set.

POLYVINYL ALCOHOL. C. J. Krister, H. J. Sedusky and G. L. Thompson (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,413,570, Dec. 31. An adhesive and film-forming composition comprising an aqueous solution of polyvinyl alcohol containing a clay.

UREA-ALDEHYDE RESINS. R. R. Harris (to American Cyanamid Co.). U. S. 2,413,624, Dec. 31. A hardenable condensation product of a urea and an aldehyde intimately mixed with a curing catalyst such as ammonium silicofluoride or ammonium borofluoride.

TERPENE COMPOSITION. E. Ott (to Hercules Powder Co.). U. S. 2,413,648, Dec. 31. The reaction product of a sulfhydrated terpene with a sulfide of phosphorus.

LAMP BASE. R. B. Thomas (to Sylvania Electric Products, Inc.). U. S. 2,413,662, Dec. 31. A hollow cylindrical lamp base of translucent plastic material.

INSULATED CONDUCTOR. W. C. Sears (to B. F. Goodrich Co.). U. S. 2,413,673, Dec. 31. An insulated electrical conductor in combination with an insulating layer comprising a plasticized vinyl chloride polymer and lead acetate.

RESINOUS COMPOSITIONS. D. E. Edgar (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,413,697, Jan. 7. A resinous composition comprising the reaction product obtained by simultaneously heating between 90 and 120° C. a linear polyamide forming composition comprising a primary diamine-dicarboxylic salt, a monohydric alcohol, formaldehyde, and urea, guanidine, or an amino triazine.

SYNTHETIC RESIN. W. O. Kenyon and L. M. Minsk (to Eastman Kodak Co.). U. S. 2,413,716, Jan. 7. A resinous material is prepared by heating a polymer comprising α-halogen-acrylic acid units in the presence of an alcohol to form lactone rings by reaction of a part of the halogen atoms and a part of the carboxyl groups and to esterify other carboxyl groups with the alcohol.

PRINTING MEMBERS. R. G. Chollar (to National Cash Register Co.) U. S. 2,413,747, Jan. 7. An elastic printing plate for use in cylinder printing is prepared from transparent plasticized elastic polyvinyl alcohol.

CONDENSATES. W. P. Ericks (to American Cyanamid Co.). U. S. 2,413,755, Jan. 7. Condensates are prepared by reacting ammeline with a compound containing an alkylene oxide ring.

SPINNING SOLUTIONS. G. H. Fremon (to Carbide and Carbon Chemicals Corp.). U. S. 2,413,758, Jan. 7. A spinnable solution in a volatile solvent of an acetone-soluble vinyl resin is formed by the polymerization of not more than three vinyl monomers each containing a single vinyl group, said resin normally forming, with such solvents, gel particles.

POLYVINYL ALCOHOL. R. A. Scheiderbauer (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,413,789, Jan. 7. The water resistance of shaped articles of polyvinyl alcohol are improved by heating in contact with an aqueous solution of a strong base and air at a temperature of 50 to 90° C. whereby said articles are rendered insensitive to water below 50° C.

LEATHER TREATMENT. G. Virtue. U. S. 2,413,806, Jan. 7. Leather shoe soles are made wear resistant by immersing the soles in a fluid bath comprising a soluble synthetic resin, a plasticizer and a volatile solvent.

MOLDING. J. P. Gits (to Jules P. Gits and J. A. Gits). U. S. 2,413,823, Jan. 7. A relatively thin tubular shell of plastic material such as a flashlight barrel is molded by forming a fabric material into a form-retaining tube with its fibers compactly compressed, placing said tube upon a die core having an external diameter substantially equal to the internal diameter of the tube, rendering workable and fluid by heat a mass of plastic material

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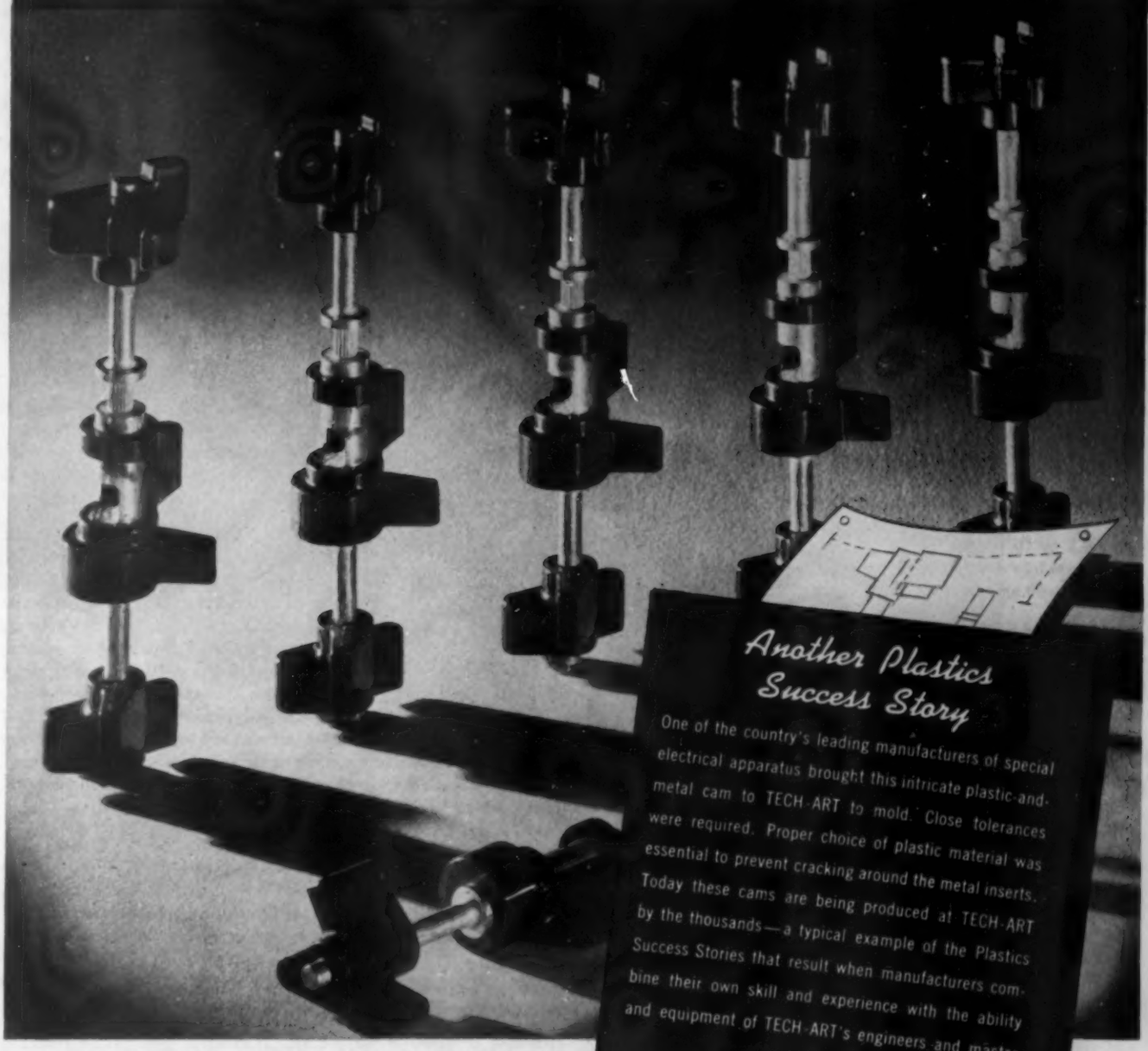
Apart from sound product engineering, there is no single factor in the production of molded plastic parts that is so vital as precision-built molds. More and more, a realization of this fact is being evidenced by leading manufacturers who, in ever-increasing numbers, are bringing their precision ideas to TECH-ART to mold. Equipped with the most modern tool making facilities, TECH-ART's master mold builders look upon their work as an art—a precise art. TECH-ART's vast production facilities comprise all types of compression, compression transfer, automatic, semi-automatic and injection molding presses. TECH-ART's broad knowledge of plastic materials insures the proper choice of specific plastic compounds. Bring your plastic ideas to TECH-ART where precision-built molds are such a vital factor in producing so many TECH-ART Plastic Success Stories.



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One of the country's leading manufacturers of special electrical apparatus brought this intricate plastic-and-metal cam to TECH-ART to mold. Close tolerances were required. Proper choice of plastic material was essential to prevent cracking around the metal inserts. Today these cams are being produced at TECH-ART by the thousands—a typical example of the Plastics Success Stories that result when manufacturers combine their own skill and experience with the ability and equipment of TECH-ART's engineers and master mold builders.

TECHNICAL NOTES—These cams were molded from a melamine mineral-filled compound in high pressure, compression transfer molds. To eliminate critical stresses which might otherwise have been set up in the finished part, the materials were electronically preheated.

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and injecting said mass into the die of said core to flow about the tube and fill the cavity of the die containing the core, employing pressure to inject the fluid mass in order compressedly to embed tube without impregnating fibers along outer surface.

RESIN. D. J. Muir. U. S. 2,413,842, Jan. 7. A resinous composition consisting of smilax resin, zinc oxide, stearic acid, mercaptobenzothiazole, and sulfur mixed together and vulcanized at 260° F. for 60 minutes in a mold.

VINYL POLYMER. F. C. Bersworth. U. S. 2,413,856, Jan. 7. A plasticized resinous product comprising a vinyl compound such as vinyl chloride homopolymers, vinyl chloride-acetate copolymers, vinyl chloride-vinylidene chloride copolymers and vinyl butyral polymers mixed with a tetra-ester of ethylene diamine tetraacetic acid.

THERMOSETTING RESINS. A. Brookes (to American Cyanamid Co.). U. S. 2,413,860, Jan. 7. A thermoset resin obtained by heat-curing a composition comprising a mixture of a condensation product of formaldehyde with an amino compound such as urea, thiourea, and melamine and, as flow promoter, the glyceryl monoether of a monohydroxy aromatic compound with benzene ring.

COPOLYMERIZATION. F. J. Soday (to United Gas Improvement Co.). U. S. 2,413,893, Jan. 7. A benzene-soluble copolymer is prepared by contacting a mixture containing piperylene and indene with 0.1 to 10 percent of an acid acting metallic halide catalyst at a temperature between −60 and 145° C.

COAT HANGER. M. D. Fortner. U. S. 2,413,914, Jan. 7. Molded hanger.

PRESSURE-SENSITIVE ADHESIVE FABRICS. G. S. Stamatoff (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,413,931, Jan. 7. A pressure-sensitive adhesive fabric comprising a backing material and deposited thereon a pressure-sensitive adhesive coating comprising a resin base of polyvinyl butyral, polyvinyl acetate and an active solvent plasticizer.

PHOTOPOLYMERIZATION. B. W. Howk and R. A. Jacobson (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,413,973, Jan. 7. Preformed plastic article is coated with a composition comprising a photopolymerizable member such as vinyl and vinylidene compounds, a cross-linking compound containing at least two terminal ethylenic groups at least one of which is conjugated with another multiple bond in the molecule and a photopolymerization catalyst such as α-ketaldonyl alcohols and vicinal polyketaldocarbonyl compounds and polymerizing said composition by subjecting it to the action of light having a wave length between 1800 and 7000 Å at a temperature safe for plastic base.

BUTTON. E. D. Janes (to Scovill Manufacturing Co.). U. S. 2,413,975, Jan. 7. A button comprising a plastic cap of molded material and a back of metal.

COATING COMPOSITIONS. W. A. Waldie (to New Wrinkle, Inc.). U. S. 2,414,006, Jan. 7. Wrinkle coating compositions are modified by adding to a wrinkle varnish base including a bottom drier and a top drier, a texture modifying agent comprising drying oil fatty acids and a solvent therefore.

VINYL COPOLYMER. A. M. Clifford and J. G. Lichty (to Wingfoot Corp.). U. S. 2,414,022, Jan. 7. A plasticized composition composed of a copolymer of vinylidene chloride and vinyl chloride plasticized with a bis (carboalkoxy) diethyl ether, the alkoxy groups having from one to eight carbon atoms.

UREA-FORMALDEHYDE RESIN. D. E. Cordier (to Libbey-Owens Ford Glass Co.). U. S. 2,414,025, Jan. 7. A thermosetting composition comprising a urea-formaldehyde condensate and dibenzyl oxalate as a latent curing catalyst.

POLYMERIC MATERIALS. M. A. Dietrich and J. E. Kirby (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,414,028, Jan. 7. Polymers are prepared by heating in the presence of a Friedel-Crafts catalyst a polymer having recurring phenylmethylene groups and stearoyl chloride in the ratio of one mol of the latter to each of said phenyl-methylene groups.

RUBBER HYDROCHLORIDE. W. Scott (to Wingfoot Corp.). U. S. 2,414,065, Jan. 7. A rubber hydrochloride film which contains, as a stabilizer, an amide of a monocarboxylic aliphatic acid with a polyalkylene polyamine.

MOLD COATING. D. F. Cole and J. F. Wynn. U. S. 2,414,093, Jan. 14. A method for preparing a mold for plastic prosthetic appliances in which synthetic resin and cellulose derivative molding compositions are protected during molding comprising making a pattern, coating the pattern with a solution of an alcohol-soluble prolamine, drying the latter to form a tough, water-impervious film, investing the pattern in an appropriate material, setting the latter thereby transferring the film from the pattern to the investment material, eliminating the pattern thus forming a mold cavity having coated and uncoated surfaces and coating the uncoated surfaces with the solution of prolamine, the latter comprising a solution of zein, castor oil, phenol, salicylic acid, aqueous ethyl alcohol and benzene, said solution being capable of forming films on a wax pattern which are transferrable to a plaster investing material.

STRUCTURAL MATERIAL FOR AIRCRAFT. G. B. Rheinfrank, Jr. U. S. 2,414,125, Jan. 14. High strength multi-ply skin stressed components of aircraft are prepared by forming a core of a low density material such as balsa wood in the shape of the finished component, draping a high strength skin made from woven glass fiber over said core, coating the skin with a fluid low-pressure synthetic resin and simultaneously impregnating and bonding the skin to the core by the application of moderate heat and a low pressure, said pressure being of such a low order as not to alter the dimensions or increase the density of the core material.

SULFUR-MODIFIED CELLULOSE ETHER. M. L. Ernsberger (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,414,144, Jan. 14. The process comprising heating at 85 to 140° C. a methallyl cellulose having at least one methallyl group per glucose unit with 1 to 4 percent of sulfur and 2 to 5 percent of zinc dibutyldithiocarbamate until the ether is insoluble in organic solvents.

BOTTLE CASE. R. M. Scharff (to Gerber Plastic Co.). U. S. 2,414,171, Jan. 14. A one-piece molded plastic beverage bottle case.

CONDENSATES OF MELAMINE. W. P. Ericks (to American Cyanamid Co.). U. S. 2,414,289, Jan. 14. The condensation product of a compound containing an alkylene oxide ring with a compound such as melamine, a hydrocarbon substituted melamine or an octadecoxypropyl melamine.

INSULATING COMPOUNDS. G. M. Hamilton (to Callenders Cable and Construction Co., Ltd.). U. S. 2,414,300, Jan. 14. An electrical insulating material which is pourable when hot, but solid at room temperature, consisting of mineral oil, solid polymerized ethylene, a rubbery hydrocarbon polymer such as polyisobutylene, polybutadiene or a copolymer of butadiene and styrene, said polymer being soluble in the oil and having the property of inhibiting the crystallization of polyethylene during cooling of composition.

PREPARATION OF POLYETHYLENE. A. T. Larson (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,414,311, Jan. 14. A process for the preparation of high molecular weight polymers of ethylene at a pressure of between 50 and 3000 atm. and a temperature between 60 and 400° C., the steps comprising passing ethylene upwardly through a reaction zone of sufficiently large diameter to permit unrestricted upflow through a large volume of water containing a catalyst such as oxygen or a peroxy catalyst, collecting the polymer as an upper layer, providing a vapor space above the water, discharging unreacted ethylene from above the polymer layer, discharging water from below the polymer layer and regulating the reaction by the flow of water and ethylene through the reaction zone.

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Plastics Stock Molds*

SHEET ONE HUNDRED FORTY-NINE

This novel line of waste paper baskets and variety racks will add color to every room in the house and in addition give utility value. Transparent and opaque acrylic trays, handsomely decorated, are delightful gift items. These are available in various shapes and sizes.

1743. Vertically ribbed waste paper basket with silvered sheet making solid wall. Dimensions are: 8½ in. long, 6 in. wide, 13 in. high.

1744. Vertically ribbed magazine rack with two compartments. Dimensions are: 14½ in. long by 7¼ in. wide at top, tapering to 5¾ in. at bottom; 6½ in. tall at outer sides. Center division piece extends to 9⅜ in. in height.

1745. Molded rack for dishes. Overall length, including cutlery rest not shown, is 18 inches. Overall width is 11 ⅛ in.; height is 3 inches.

1746. Horizontally ribbed magazine rack with two compartments. Dimensions are: 13⅜ in. long by 6⅜ in. wide. Outer sides stand 11¾ in. high while center division piece extends to 14½ in. in height.

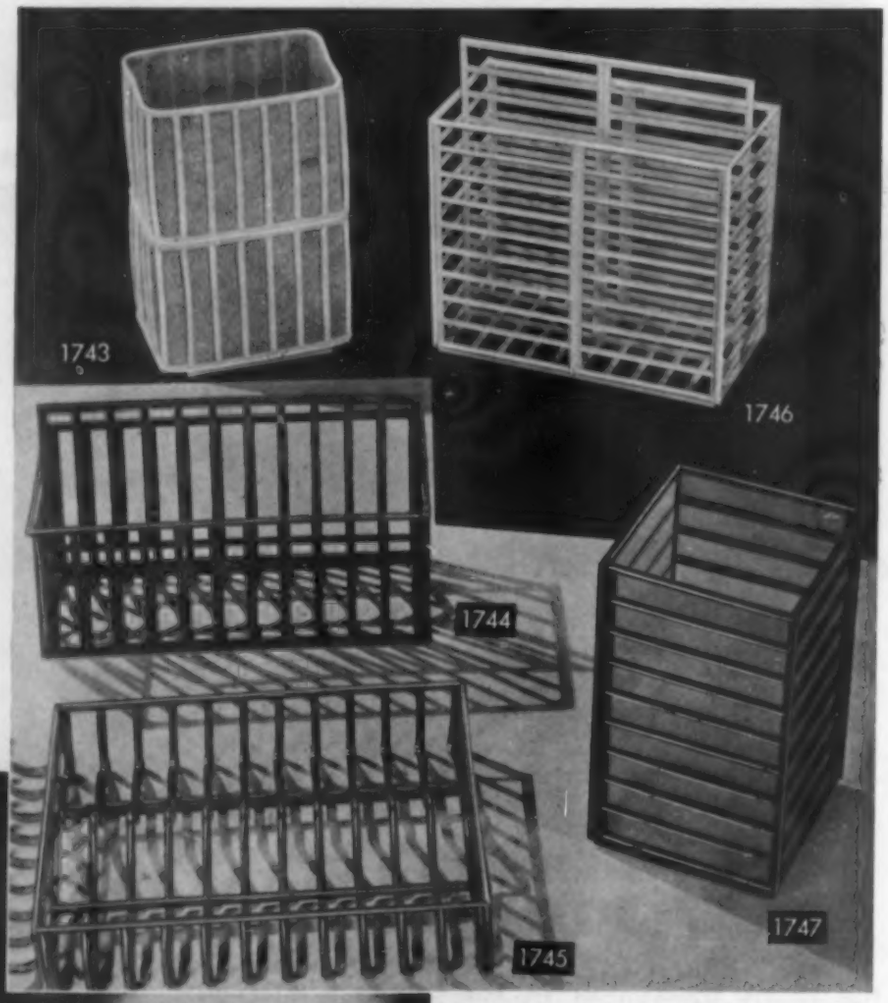
1747. Horizontally ribbed waste paper basket 6¾ in. square. Translucent sheet fastened to ribs makes solid wall. Height is 11¾ inches.

1748. Large rectangular serving tray. Corners are formed to assure firm grip. Dimensions are: 17¾ in. long, 13½ in. wide, 1½ in. deep.

1749. Small rectangular serving tray. Corners are formed to assure firm grip. Tray is 15 in. long by 8½ in. wide by 1¼ in. deep.

1750. Transparent serving tray, 9½ in. square, with handle.

1751. Round serving tray having pie-crusted edges, 11 in. diameter.



The names and addresses of the manufacturers who make these stock molds are listed on page 236.

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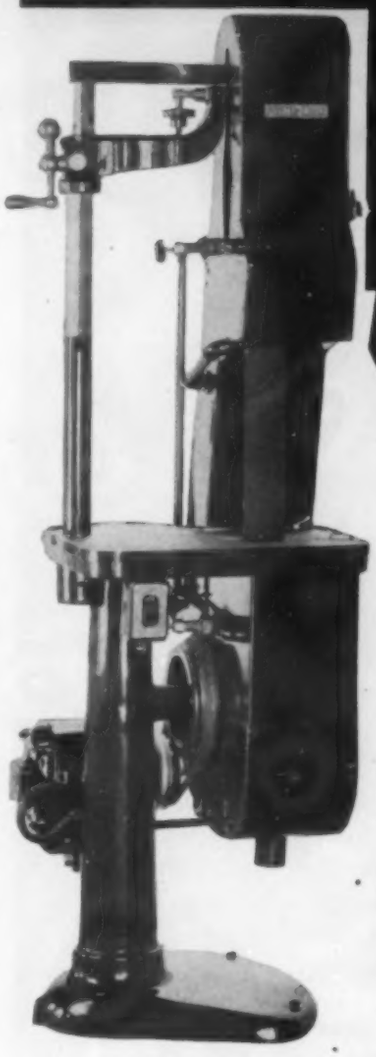

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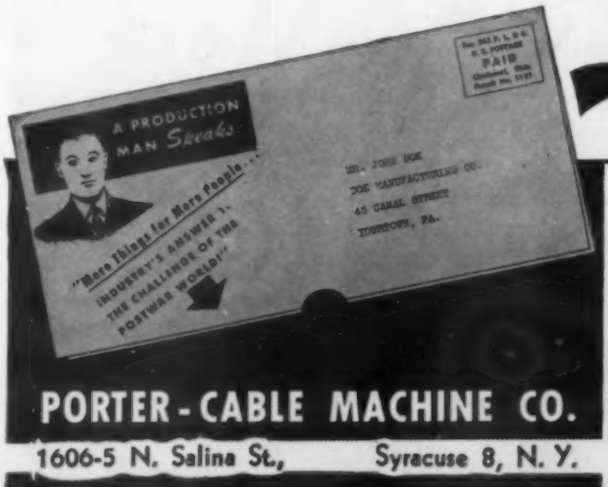

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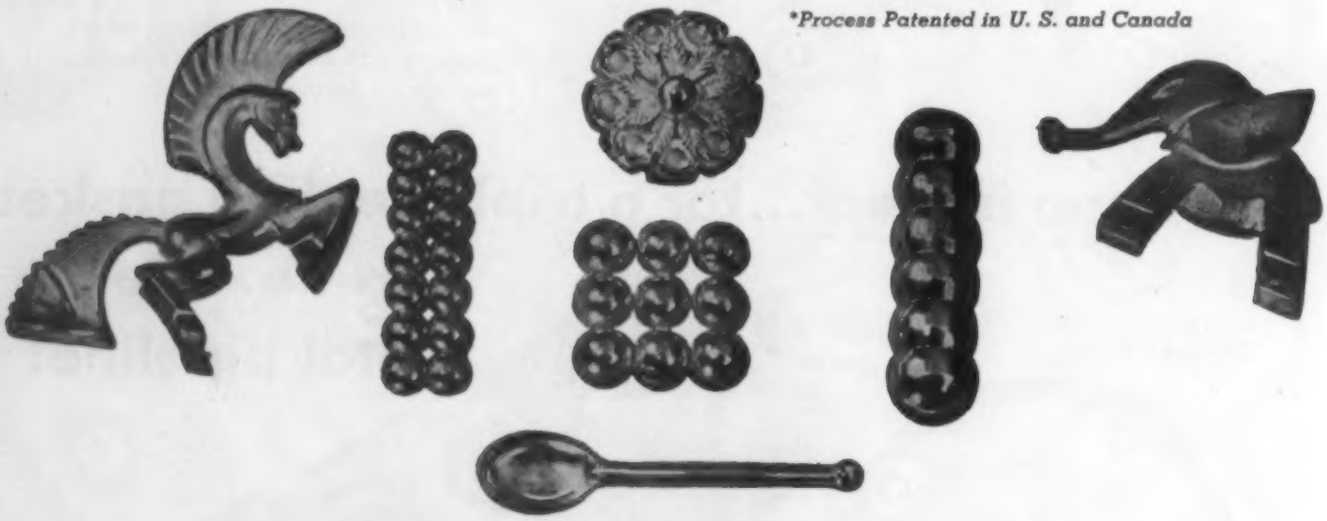

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Urea formaldehyde is used in the socket, switch, silky finish lampshade and diffusing bowl of this wall lamp

Urea lighting fixtures

LUMINOUS plastic switches, plastic sockets, shades resembling silk, and diffusing bowls have enabled the Railley Corp. of Cleveland, Ohio, to incorporate new design advances in its table lamps and line of Pin-It-Up* lamps.

By capitalizing on the advantages plastics had to offer and departing somewhat from conventional lamp types, the company has turned out what it believes to be a more functional, more efficient and attractive lamp. At the same time shipping costs have been cut through the use of lighter materials and storage space has been saved through redesigning which permits a package 35 percent smaller than the previous type.

The selection of the most suitable plastic material for the new lamps was the first step in the company's program. Urea-formaldehyde edged out other plastic materials in the choosing of a plastic for the parts because of its versatile qualities. Found by the company to possess the best balance of translucence and stability under heat, urea was used in the manufacture of the diffusing bowls and lampshades. Phenolics were not employed because they lack the translucence essential for these two uses. Several thermoplastics which transmit light were considered but failed to stand up under heat as well as urea.

Compared with glass of the same color, equal to, or better light transmission from the same degree of translucence was secured. The problem of shipping also had to be taken into consideration. The urea parts are lighter than similar glass parts and breakage is far less likely to occur en route. The elimination of easy breakage also proved an asset in the assembly of the lamps and in their use by the ultimate consumer.

The company was able to get all of these advantages

* Reg. U. Patent Office.

Rayon trim was applied to lamp shade to further enhance its silky appearance

A higher production rate and a new design were achieved when urea-formaldehyde was used in table and wall lamps

without an increase in cost, because, although plastic is more expensive than glass, it can be molded much thinner. A higher rate of production was also possible.

A plastic socket was decided upon for a number of reasons. It could be styled in a more modern and functional form, its surface is permanent and does not require painting. Again a higher rate of production could be obtained with it than with other materials. Urea appeared to be the best choice. At the present time, only ivory and brown sockets are being produced. These two colors were felt to be most adaptable to the colors which predominate in today's lamps and shades. However, a wide variety of colors would be possible if an application should require it.

Luminous switch

There's no fumbling in the dark or stumbling over furniture with these lamps for the urea used for the switches contains fluorescent pigment which makes the finished parts clearly visible at night. The wall lamps are available with push-button or turn-switch types. The push-button type is located on the face of the wall plate while the turn-knob type is placed at the base of the socket to form an integral part of the overall design. On the table models, the switch does double duty, acting as a finial as well as a switch.

Monowatt Electric Corp. of Providence, R. I., produces the switch base and actuating button by transfer molding. The socket parts are turned out by a straight compression type mold. No particular molding problems were encountered for ease of molding was a primary consideration. To accomplish this, the socket, instead of being split horizontally, was divided vertically. It can be held in place with one screw.

The diffusing bowls are manufactured by the Plastics

Div. of General Electric Co. at Meriden, Conn., from Plaskon by the straight compression molding process. One style serves as a shade holder on table lamps. A 4-cavity mold and 4.25 oz. of urea are required to produce a bowl with a diameter of $6^{3}/_{32}$ inches. Another style which comes in 9- and 12-in. diameters can be suspended from a ceiling fixture by chains. A 2-cavity mold and 7.0 oz. of urea are needed for the 12-in. size. After molding operations, the ceiling bowl diameters are inverted and clamped to a revolving form while a file is held against the lower edge to remove flash. Three holes are drilled at points spotted by the mold.

Shades, also of Plaskon, are produced by G. E. by same method as the bowls. Available in 10-, 12-, 16- and 19-in. sizes, they are cleaned on a revolving form with a special cutter at the top. The shade is placed on the form and held stationary while the cutter makes several revolutions and removes flash at top of shade. It is then clamped to a revolving form and flash at bottom edge is removed with a file. But one step more is required. The shades are sand-blasted after molding to give the appearance of silk. And while the shade has the sheen of silk, the unsightly shadows of the wire frame—a necessary part of a silk shade—are eliminated. Although delicate in appearance, the plastic shade is strong, durable, easily dusted and washed.

A rayon ribbon and braid trim is applied in the Railley plant with a water-proof cement.

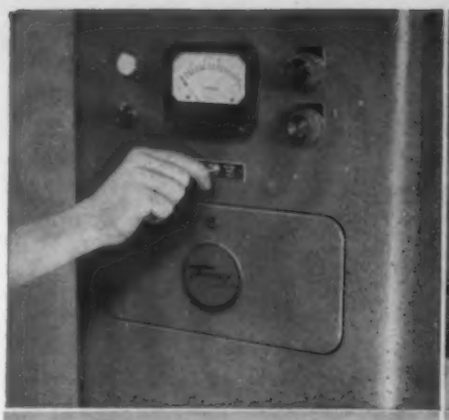
Deep-set socket increases light

Utilization of the good qualities in the urea-formaldehyde was not enough. The company has gone even further and developed new techniques which it feels have increased the value of its lamps even more.

By submerging the plastic socket into the base of the table models, added beauty coupled with improved lighting standards has been achieved. There is no unsightly metal to project up and detract from the smooth, streamlined appearance. The top of the socket is indented to accommodate the reflector securely without use of screws. This, together with the lowered socket, makes the reflector appear to rise up out of the base in an unbroken line.

The bulb is lowered approximately two inches by this method. This increases the spread of soft, glareless light, of greater intensity, over a wider area

The flame-shaped urea finial shown here on a lamp also serves as a switch. It contains fluorescent pigment which makes it clearly visible at night



Operator flips selector switch, thereby sets automatic timers for desired heating cycle. This Thermex unit keeps two presses of varying loads busy, alternately or in any sequence. A remote control attachment permits starting the unit from press position when desired.

Operator opens sliding drawer heating compartment, easily puts preforms on electrode. He does not have to reach up and over—face of drawer goes down and out of the way. Note electrode height adjustment, controlled by knob over drawer compartment.

Drawer face lifts up into position as operator closes drawer. High frequency heat turns on when drawer is closed, automatically shuts off at desired preform temperature. Open wire grill on drawer face permits free flow of air during heating cycle.

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Model 2R2A

THE high frequency heating of plastic materials is made more convenient than ever by the *improved* sliding drawer action of this THERMEX Red Head.

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You get capacity in a compact package. This portable THERMEX unit, only 17⅛" wide and 27⅛" deep, is equipped with dual timers and keeps two presses busy. Takes preforms up to 4¾" thick. Uniformly heats 1½ lbs. of general purpose plastic material in one minute.

You get accessibility throughout. The dual timers are controlled by a simple switch and electrode height is adjusted by a simple knob—both conveniently located on the front of the cabinet. "Set up" controls are grouped in a recessed panel reached through a door in front of the cabinet.

And you get the durability built into all THERMEX Red Heads. Automatic devices guard against every possible cause for functional misbehavior. The Girdler Corporation, Thermex Division, Louisville 1, Kentucky.

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THE FIRST INDUSTRIAL HIGH FREQUENCY DIELECTRIC HEATING EQUIPMENT

with the same lamp, same size shade and same wattage bulb. For example, with a lamp which has a shade 13 in. in diameter, the cut-off of the angle of light is at a radius of $20^1/_8$ inches. With the deep-set socket, the cut-off reaches $31^5/_8$ in. or $11^1/_2$ in. greater radius of light—an increase of 147 percent light area.

In the lamp models where a flame-shaped switch also serves as the finial, the socket is inverted on a metal ivory-finished rod. This feature has been found to give 52 percent more light. By lowering the point of the filament in the bulb, the greater light spread is possible. A lamp with an inverted plastic socket, a 100-watt bulb, a $12^1/_2$-in. pedestal and 16-in. shade, was found to have a light spread of 3318.3 sq. in. The conventional type lamp with $12^1/_2$-in. pedestal, 100-watt bulb and 16-in. shade had a light spread of 2185.4 sq. inches. A graceful table lamp with classic type vase of glazed pottery incorporates this feature and is shown in illustration on page 180.

The wall lamps feature a metal shield which is made to fit into the top of the reflector bowls. These are said to increase useful light up to 72 percent, eliminate upward glare, permitting the lamp to be mounted below eye level. The recommended height is 55 in. from the floor to the top of the shade.

Repackaging saves space

Even the packaging of many models of these wall lamps has undergone considerable change for some lamps are made with the wall plate and arm in separate pieces. Conventional type individual packing requires a partitioned carton with separate sections for the bracket and shade. Now, the wall plate and arm can be placed side by side at the bottom of the cardboard container with the shade directly above in a much smaller carton. This box requires 35 percent less space, is easier to handle and possesses a desirable feature for warehouse and stockroom storage. For example, a lamp which formerly required a box 11 by $14^3/_4$ by $7^3/_4$ in. now only needs a carton which is 10 by 10 by 8 inches.

The lamp can be assembled in a few seconds with no screws or extra parts. The wall plate is equipped with a special lock-notch which holds the arm firmly and securely. It is finished front and back with two extra coats of baked synthetic enamel.

The finial slips over top of inverted plastic socket. This arrangement lowers filament of bulb, is said to provide more light than conventional type

What about silicone-glass laminates?

A MOST unusual meeting was held in Cincinnati a few weeks ago when representatives of the U. S. Navy met with a group of laminators and materials producers to evaluate what had been accomplished in the development of silicone-glass laminates for electrical equipment and what could be done to meet the Navy's need for a high strength, non-toxic, high heat and arc resistant material that would withstand the most extreme climatic or battle conditions.

Navy sponsors research

This is not the first time that the U. S. Navy has encouraged the development of a particular plastic. Back in 1935, Navy researchers became convinced of the superior qualities of vinyl chloride insulation for wire and cable coating and helped to start vinyl on the way to large scale production. Likewise it was substantially the same group now working on silicone laminates that developed glass melamine laminates for Navy use during the war. It is estimated that laminators are now selling at least 15,000 lb. a month of products originally developed for the U. S. Navy. And almost every one of them was "impossible" before it was accomplished by this cooperation between user, producer, processor.

For example, electrical equipment men believed it impossible to machine melamine-glass. But when they put carbide tips on the teeth of old type high speed carbon steel saws, drills and other machining tools, they found that melamine-glass could be cut or punched as well or better than older-type laminates and that holes can be drilled nearer the edge in glass-melamine than in many other types of laminates.

One of the Navy's reasons for desiring a more heat resistant laminated material for panel boards and circuit breakers is due to the fact that electrical circuit structure on ships is quite different from ordinary civilian installations. When four guns or sixteen pumps are controlled through the same board it is much safer in time of battle or storm to lose one permanently than to lose several temporarily, for modern battles are won in a matter of moments. The goal in Navy circuit construction is to confine the damage to one circuit—if the breaker catches fire every effort is made to confine that fire to the affected part by use of fire resistant materials—if it spreads or the electric current arcs to neighboring fixtures the ship is further handicapped.

During the latter stages of the war and up to date, experimental work has resulted in the creation of a laminating material consisting of silicone resin binder

Doll manufactured by Ideal Novelty & Toy Co., Hollis, L.I., N. Y.

Here's a doll that can take fall after fall without breaking her head—for this once-fragile part now is molded from a tough ethyl cellulose plastic (Celanese "Celcon").

Formerly restricted 100% to war needs (such as the V-T Fuze) because of its outstanding toughness, impact resistance, and dimensional stability, Hercules ethyl cellulose is again in full supply. Molders and manufacturers are invited to investigate the unusual properties of this economical thermoplastic for toys, housings, handles, and other products. Send for technical booklets.

Ethyl cellulose flashlight cases, proved best for Army use, now first civilian choice

Ethyl cellulose radio cabinets have high impact strength, excellent acoustical properties

Ethyl cellulose tool handles are tough, colorful, and pleasant to the touch

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combined with glass cloth to produce an insulating sheet which is essentially inorganic.

The comparative properties of various laminates as listed by the Navy are given in Table I. It should be noted that those for silicone laminates in the last column of the table are what the Navy believes possible at the present state of development.

From the readings in Table I it can be seen that in some respects a glass-cloth silicone laminate made to specifications which the Navy thinks possible has properties inferior to the others. Its mechanical strength is lower, it has less bond strength and various other limitations. The Cincinnati group's ambition was to find ways to correct these limitations and give the Navy an all purpose laminate that would withstand 200 to 300° C. and still have the necessary mechanical strength. Other laminates are limited to about 125° C.

The next step was to correlate the experimental work now being done. Previously production was confined to small lots with each processor using different batches of resin and various types of glass cloth. As many as 65 different experimental types of fabric have been evaluated to date. Consequently test results are not comparable. Company representatives at the meeting agreed to confine their tests to six types of glass fabrics furnished by Owens-Corning Fiberglas Corp., all to be

Table I.—Comparative Properties of 3 Laminates[a]

Filler material *Binder material* *Navy grade (JAN-P-13)*	*Cotton cloth phenolic FBG*	*Glass cloth melamine GMG*	*Glass cloth silicone GSG[b]*
Specific gravity	1.35	2.00	1.80
Water absorption, 1/8 in. thick, D24/25, percent	1.25	1.45	0.5
Flexural strength, 1/2 in. thick			
lengthwise, flatwise, p.s.i.	18,000	41,200	18,000
lengthwise, edgewise, p.s.i.	17,500	40,000	20,000
Bond strength, lb.	Over 1600		900
Tensile strength, lengthwise, p.s.i.	9000	25,000	17,000
Impact strength, ft. lb./in.			
lengthwise, flatwise	2.5	19.5	12
lengthwise, edgewise	1.5		8
Dielectric strength, S/T, dry			
1/8 in. thick perpendic. v./mil	300	350	300
1/2 in. parallel, kv.	45	30	50
Dielectric losses, 1 mc.			
dry, Dielectric constant	5.3	7.0	4.2
Power factor	0.05	0.015	0.0020
Loss factor	0.065	0.105	0.0090
D24/25, Dielectric. constant	6.0		4.5
Power factor	0.10	High	0.0100
Loss factor	0.080		0.0500
Insulation resistance, megohms (D96/50)	1.3	2.0	200
Arc resistance, sec.	10	189	250
Heat distortion,° C.	140	Over 200	Over 200
Toxicity	Lethal	Non-lethal	Safe

[a] Values in the above tables are taken from JAN-P-13 for FBG and GMG when tested. Those values not listed in JAN-P-13 for GMG are representative test values obtained on production lots. All values on GSG are representative test averages.
[b] Proposed designation.

treated with resin from the same batch to be supplied by Dow Corning Corp. The fabrics will vary in type of weave, degree of fineness in filament, weight, sizing and openness of interstices between the fibers.

This program will require approximately 2000 yd. of glass fabric. After the laminators have made as nearly identical tests as possible the finished laminates will be compared. The Navy will then draw up specifications for an all purpose silicone laminate having the best possible electrical and mechanical properties. Presumably this material may then go into commercial production for use in various electrical equipment.

Type of glass fabric important

The type of glass fabric employed in the laminate is of major importance. Filament diameter, sizing, type of weave and method of cleaning the fabric are all under investigation. Improved bond strength without decreasing the material's splendid electrical properties is what the investigators are seeking in their efforts to find the perfect combination of fabric and resin. Present silicone resins useful for laminating wet the glass with difficulty and the total adhesive strength is not realized. Consequently a laminate is susceptible to water absorption and delamination due to inadequate adhesion between the plies. Improvements already made indicate that the proper combination of fabric and processing of the laminate will remedy this fault.

Staple fiber fabrics have been investigated intensively for this program because the fuzzy nature of the yarn gives a greater bond strength to the silicone laminates. However, staple fibers do not have the maximum strength inherent in glass. These high strengths can only be realized through successful utilization of continuous fiber fabrics. Consequently, it is believed that the use of staple fabrics is only an interim solution.

Experiments have been conducted with a fabric containing a combination of continuous yarns and staple in both warp and fill on the presumption that the staple fiber will improve the bond strength while the continuous fiber gives the required mechanical strength. There is a considerable difference of opinion over the result with one laminator declaring that his tests indicate no advantage in combination fabric and that he has obtained good results with continuous fiber material.

It is equally apparent that the size on the glass is of extremely critical importance. The producer has experimented with various sizes, but no matter what sizing is used, it must be removed before the fabric can be laminated since the fabric will eventually be subjected to a 250° C. temperature and any organic sizing or oil in the fabric would become carbonized and degrade the electrical properties of the end product.

Up to date, heat cleaning or washing is the most satisfactory method for removing the sizes. Most sizings can be removed by heat. This is done at elevated temperatures (600 to 700° F.) either by festooning or in roll form until the fabric becomes white. The time variable is a function of the thickness of the fabric and way it is heat cleaned. (*Please turn to next page*)

ALL DIE MOVEMENTS AND PLASTICS INJECTION PLUNGER ARE OPERATED FROM A SINGLE HYDRAULIC CYLINDER

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Facts

ABOUT G. & L.

The design of this advanced vertical plastic injection press is the result of practical research coupled with the broad overall experience of Giddings & Lewis field, design and production engineers. Back of it, lie years of successful G. & L. ingenuity in building high quality precision machine tools.

You are Cordially Invited

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G&L PLASTICS DIVISION

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PLASTICS DIVISION

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In recent experiments, heat cleaning has been followed by finishing with silicone oil or elastomer. Varying results have been obtained but in at least one instance a flexural strength of 18,000 p.s.i. and a power factor of 0.010 after 24 hr. immersion in water has been obtained.

All those present were unanimous on at least one point. No matter how the material is cleaned it must be handled with utmost care. The washing is done best by reputable cotton fabric finishers. The fabric must be handled as little as possible, kept carefully covered and never be permitted to come in contact with other materials. The same precautions are necessary with the resin which has an annoying habit of picking up impurities from some types of metal.

A silicone resin producer who was present pointed out that the complaints of non-uniform batches were congenital to the birth of any new resin—time and experience would straighten out that difficulty, but the fundamental problem of making silicone adhere to glass is far from solved. On the matter of bond strength, the speaker pointed out that it was not always necessary to have flexural strength of 25,000 to 30,000 p.s.i. simply because present material in rotating electrical equipment has that strength. He recommended that users find some method of determining exactly what strength is required. In discussing the stability of a silicone-glass laminate he pointed out that the dielectric strength of molded silicone-glass matte was sometimes said to be superior to a laminate on the theory that the fibers are meshed and that the principal trouble with a continuous fiber fabric used for laminating was that water could easily creep along the smooth fibers. When questioned on the use of a plasticizer with silicone resin he answered that it would make a softer material, might decrease water absorption and give better adhesion, but that it would make the resin subject to heat distortion and lower its flexural strength. One laminator reported that he was using DC 993 plasticizer to diminish crazing and that as a result he had produced a laminate which would withstand 500 volts per mil compared to the 200 volts per mil for resin without the addition of plasticizer. The same laminator reported that a low resin content permitted a more thorough job of fiber impregnation. On the matter of crazing it was asserted that the larger the voids in the fabric the greater the tendency to craze and if resin particles are kept small enough, crazing should be negligible.

There was some question about shelf life, users claiming that there was a tendency for the uncatalyzed resin to gel with age. Producers promised to look into that feature and also warned that triethanolamine catalyzed resin was tremendously affected by small amounts of dirt on glass. Acetic acid will add to the shelf life of catalyzed resin.

A general discussion on arc resistance and arc tracking led one of the group to state that pure silicone resin and glass fabric each has superlative arc resistant properties, but when combined, arc tracking is affected somewhat adversely. However, majority opinion held

that this situation was well on the way toward correction. Navy officials point out that if an electrical device fails due to arcing severe enough to destroy the current carrying parts and cause a fire, the Navy wants laminated and molded insulation that will not add to the flame.

The standard treatment to be used by the laminators in preparing their laminates, with allowance for slight variations to fit their convenience, is one or two dips of the fabric depending upon its weight, molding time of 60 min. under 125 p.s.i. steam pressure and at 1500 p.s.i. hydraulic pressure, and a curing schedule starting with 16 hours at 85° C., followed by several hours baking at increasing temperatures until it has finally baked several hours at 250° C. A total of between 30 and 48 hours is involved. The long bake is to minimize the tendency of laminates to blister at such high temperatures.

Let no reader despair that the vexatious problems accompanying this development are any more serious than those attending the birth of other plastics materials. The statement is often made that about seven years are usually required to develop a resin for wide commercial adaptation. The silicones are coming along remarkably fast considering their unusual chemical structure for materials used in plastics. Laminators are satisfied that silicone laminates have a great future in the electrical equipment field.

It is encouraging and prophetic of rapid results to note that developers are willing to pool their combined knowledge in an effort to give the Navy a better fighting tool, but it is important to know that this task cannot be performed without the expenditure of hundreds of thousands of dollars and thousands of hours of research and laboratory effort.

Other silicone-glass programs including chemically resistant walking flats over batteries on submarines and molded silicone-glass for electrical applications are well under way. The motor and transformer programs have made very good progress, and a 10 hp. aircraft generator with silicone-glass insulation has been put into use at a considerable saving of weight—most important feature in aircraft equipment. Another Navy job was a single phase transformer weighing one third less than previous types. This new design transformer was equipped with silicone impregnating varnish on glass covered wire, silicone rubber coil leads, silicone laminated spacer blocks.

Companies represented at meeting

Companies represented at the meeting which was held at the Formica Insulation Company's plant in Cincinnati under the chairmanship of H. P. Walker from the Bureau of Ships, Navy Dept., were: Glass Fibers, Inc., Dow Corning Corp., I. T. E. Circuit Breaker Co., Taylor Fibre Co., General Electric Co., Mica Insulator Co., Owens-Corning Fiberglas Corp., Gustin Bacon Mfg. Co., Continental-Diamond Fibre Co., National Vulcanized Fibre Co., Army Air Forces at Wright Field, Formica Insulation Co.

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PHOTO, COURTESY BAKELITE CORP

The all-polystyrene harmonica is composed of 5 different molded parts. This compares with 80 parts in old-type harmonicas requiring 150 separate assembly operations

The value of controls

by C. W. BOWDEN, JR., H. F. HOYLER*

HARMONICA manufacture is precision work. High quality and close tolerances must be maintained to insure good tone and proper tune. This means close control over all steps in the manufacture of these units—a control which in the injection molding of harmonica parts, is dependent in great part on modern industrial instruments.

A case in point is the control afforded by such instruments as millivoltmeter pyrometer controllers on the heating cylinder and a Brown Electronik potentiometer pyrometer controller on mold in the injection molding plant of International Plastic Harmonica Corp.

The polystyrene harmonicas produced by this company are composed of only five parts, each of which is injection molded. Invented and developed by Finn H. Magnus, president of the harmonica company, the instrument is said by harmonica experts to be at least the equal of conventional harmonicas with respect to tonal qualities and, in addition, to be more sanitary, more pleasing to the touch and far more colorful.

All these qualities, attributable to the use of plastics and to quality work in the molding, make it possible for American industry to compete in the large harmonica market which was formerly monopolized by German manufacturers. This market is surprisingly large. In a normal prewar year, harmonica sales in this country amounted to more than 10,000,000 units and to over $8,000,000 in gross consumer sales.

The old and new harmonicas

In the past, harmonicas were manufactured by traditional European handcraft methods. Each instru-

* Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

PHOTOS, COURTESY BROWN INSTRUMENT CO.

For good tonal quality, it is important that all harmonica parts be held to a tolerance as close as 0.0001 in., which means that each press operation must be closely controlled

in molding

ment was composed of over 80 parts, assembled by more than 150 separate operations, many of them highly skilled. The reeds, for example (the functional parts of the harmonica) were hand ground to size from punch pressed blanks.

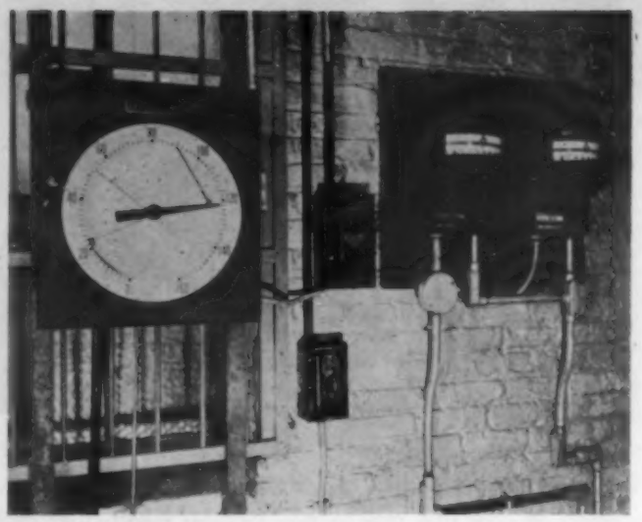
That all these parts and all these skilled operations could be reduced to five parts and an assembly time of 15 seconds is a triumph both for plastics and for the precision molding achieved at the International Plastics Harmonica Corp. plant.

The secret of this plastic harmonica is the reed plate wherein all 10 reeds are molded as one piece, and the secret of the plate is the almost unbelievable tolerances of as close as 0.0001 in. that are achieved. To maintain such accuracy, the mold design is of prime importance. Mr. Magnus has invented a precision mold for the reed plate which produces four complete plates with each cycle of the injection press. The plates emerge from the mold complete in every respect with each reed in perfect tune. According to officials of the company, regular tests of the reeds against a chromatic stroboscope have failed to detect a single flaw.

Selection of the proper molding material for the harmonica was also critical. Requirements were for a material with good tonal quality, dimensional stability, impact resistance and, of course, ease of molding. Bakelite polystyrene molding powder was finally selected as a material meeting all of these requirements.

Control of temperature

Of the factors affecting the molding of all the harmonica parts and of the reed plates in particular, none is more important than temperature. During the early development of this harmonica it was discovered



PHOTO, COURTESY BROWN INSTRUMENT CO.

Instruments control temperatures of heating cylinder and mold. Temperature range is a most critical factor in injection molding of reed plate, heart of the harmonica

that even small differences in temperature had a very pronounced effect upon quality and that the established tolerances could not be met except when temperature control was available. Control of temperature was necessary on the mold as well as on the heating cylinder of the injection press.

The heating cylinder control employed in this work is set up according to the conventional pattern. Two electric zone heaters are employed and each is controlled by a Brown millivoltmeter electric control pyrometer. The scale range of these instruments is 0 to 600° F., and the control index is set at 450° F. Very satisfactory results are obtained by this method which assures that each "shot" of polystyrene enters the mold at exactly the same consistency.

The most critical temperature, however, has been found to be that of the mold itself. Very slight differences in mold temperature result in an incompletely filled mold or the production of molding flash. Either condition causes the part to be rejected. It has been established that temperature control to $\frac{1}{2}$° F. will eliminate these defects and will insure the output of harmonica parts meeting all specifications.

To satisfy this exacting requirement, Brown Electronik electric control potentiometer pyrometers with a temperature range of 0 to 160° F. were installed on all injection presses. The continuous balance action of these instruments initiates corrective control action the instant that the mold temperature deviates from the set point. Mold temperature is consistently maintained between 120 and 121° F., enabling production of high quality parts with a minimum of rejects.

The requirement for close temperature control of injection molds described in this article is not unique. There is an increasing tendency in the plastics industry to control mold temperature for all precision injection work as has been done by this company.

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Production

THESE statistics represent the shipments and consumption of plastics and synthetic resins as reported by 79 manufacturing companies and company departments. Data for synthetic resins for protective coatings are not included. Shipments, for the purpose of this report, include data for plastics and resins which are manufactured by the reporting companies or company divisions and shipped to outside users. Consumption refers to the quantities of plastics

PLASTICS AND SYNTHETIC RESIN PRODUCTION
From Statistics Compiled by Bureau of

Materials
Cellulose acetate and mixed ester plastics[a]
Sheets
Continuous (under 0.003 gage)
Continuous (0.003 gage and upward)
All other sheets, rods and tubes
Molding and extrusion materials
Total
Nitrocellulose plastics[a]
Sheets
Rods and tubes
Total
Other cellulose plastics[a,b]
Phenolic and other tar acid resins
Laminating (dry basis)
Adhesives (dry basis)
Molding materials[a]
All other, including casting (dry basis)[c]
Total
Urea and melamine resins
Adhesives (dry basis)
Textile and paper treating (dry basis)
All other, including laminating (dry basis)[c,d]
Total
Polystyrene[c,e]
Vinyl resins
Sheeting and film, including safety glass sheeting[a]
Textile and paper coating resins (resin content)
Molding and extrusion materials (resin content)
All other, including adhesives (resin content)[c]
Total
Miscellaneous resins
Molding materials[c,f]
All other (dry basis)[c,g]
Total
Grand Total

[a] Includes fillers, plasticizers and extenders. [b] Includes methyl and ethyl cellulose and related plastics. [c] Excludes data for protective coating resins. [d] Excludes urea and melamine molding materials; see footnote *f*. [e] Dry basis,

# of plastics

and resins which are manufactured and used by the reporting companies or company divisions.

Monthly statistics are available beginning June 1945. Data for cellulose plastic products only, are available for January through May 1945. Readers should note that this report varies from the annual Tariff Commission study, which covers all synthetic resins. Some changes have been made in production figures of certain materials for January 1947.

IN POUNDS FOR JAN. AND FEB. 1947
Census, Industry Division, Chemical Unit

January 1947	*February 1947*	*Total for first 2 months—1947*
816,954	663,254	1,480,208
636,257	479,890	1,116,147
467,128	337,581	804,709
7,656,594	7,081,388	14,737,982
9,576,933	8,562,113	18,139,046
1,051,751	842,837	1,894,588
545,121	476,042	1,021,163
1,596,872	1,318,879	2,915,751
584,683	451,054	1,035,737
3,884,433[A]	2,689,068	6,573,501
1,545,052[A]	1,667,023	3,212,075
14,736,607	12,713,705	27,450,312
6,814,636	6,345,969	13,160,605
26,980,728[A]	23,415,765	50,396,493
3,631,375[A]	4,523,676	8,137,051
1,510,363	1,352,485	2,862,848
882,654	781,351	1,664,005
6,024,392[A]	6,657,512	12,681,904
7,431,671[A]	6,963,601	14,395,272
6,196,557	5,131,196	11,327,753
1,237,297	892,431	2,129,728
6,801,822	5,344,800	12,146,622
3,096,480	2,255,049	5,351,529
17,332,156	13,623,476	30,955,632
5,631,342	5,597,857	11,229,199
2,558,976[A]	2,049,852	4,608,828
8,190,318[A]	7,647,709	15,838,027
77,717,753	68,640,109	146,357,862

Including necessary coloring material. / Includes data for urea and melamine, acrylic acid and miscellaneous molding material. # Includes data for petroleum resins, acrylic acid ester resins, mixtures, synthetic materials. [A] Revised.

An all-plastic faucet

FROM France there comes news of a faucet molded of Setax—a material containing synthetic resins which render it highly resistant to corrosive liquids, even at temperatures above boiling.

Much credit is due the Société Pour L'Application des Matières Plastiques Et Élastiques, Paris, for perfecting the plastic material and molding a faucet which overcomes many of the difficulties which formerly made plastic faucets impractical. Among the advantages the company claims for the faucet are: 1) a shock resistance equal to that of grey cast iron; 2) resistance not only to extremes but sudden changes in temperatures; 3) good insulating properties (the faucet can be handled at high temperatures without risk of burning hands); 4) self-lubricating qualities in the material.

The Ampel faucet, as it is called, is molded in four parts which do not include the packing parts. A metal fitting is molded right into one part of the faucet and allows it to be attached to various kinds of piping. All molding is done under high pressure and when the faucet leaves the mold it has a permanent high polish that requires no further finishing. The gloss almost entirely eliminates the formation of deposits which might be caused by fluids. Interestingly enough, the faucet can be made in any color or color combination.

A completed plastic faucet is shown at right while below are various parts of the molded faucet. Molded-in metal fitting allows faucet to be attached to all kinds of piping

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F. H. Robertson Co., Boston
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Root-Neal Co., Buffalo
John F. Diehl Co., New York City
Fink Tool Co., Rochester
W. J. Kelly Supply Co., Syracuse
Ohio
Die Supply Co., Cleveland
E. C. George Machine Tool Co., Dayton
Pennsylvania
Paul J. Fleming, Philadelphia
W. P. Jones (Westvol Prod.), Pittsburgh
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Merchandise buyers discuss plastics

A "MERCHANDISE Buyers' Critique on Plastics," in which representatives of Sears Roebuck & Co. and Montgomery Ward & Co. "took their hair down" and told just how they felt about plastics, featured the dinner meeting of the Midwest Chapter, Society of the Plastics Industry, staged at the Edgewater Beach Hotel, Chicago, Ill., on March 20.

C. N. Sprankle, sales manager, Sandee Mfg. Co., conducted the session, introducing W. J. Rowles, house furnishings buyer, Montgomery Ward; D. Barnes, radio division, Margaret Richey, buyer of luggage and associated items, and Sid Boyer, refrigerator buyer, all of Sears Roebuck & Co.; J. C. MacDonald, manager of the Montgomery Ward testing laboratory; and L. W. Scott, furniture buyer, Montgomery Ward. In the absence of William Hayhurst, Sears toy buyer, a letter was read expressing his views on plastics in toys. A discussion period followed.

While expressing admiration for the rapid progress made by plastics in numerous lines of merchandise, the buyers agreed that closer supervision of end uses, informative labeling and a broad program of consumer education would be beneficial. They also urged the industry to test finished radio cabinets and other items under actual service conditions before submitting them, rather than coming to the buyers with material samples, blueprints and charts of technical specifications.

Comment indicated that plastics have won firm acceptance in the refrigerator field, but that many consumers believe plastic radio cabinets are stereotyped in design, too limited in colors, and prone to crack or warp. Luggage was said to offer wide possibilities for plastic materials, but mold costs and other limitations must be overcome before real volume can be attained, one buyer pointed out. An unfinished shell cannot be sold as luggage. Wholesalers don't want to do finishing.

Unsupported films are winning acceptance in furniture, but require different methods of handling from those used with leather and there is considerable resistance to their adoption by upholstery workers. One furniture buyer said that what is needed in furniture is a plastic yarn filament from which a material can be woven having the feel of a fabric as well as the durability and cleanability of vinyl film, and selling at not more than $2.00 per yard.

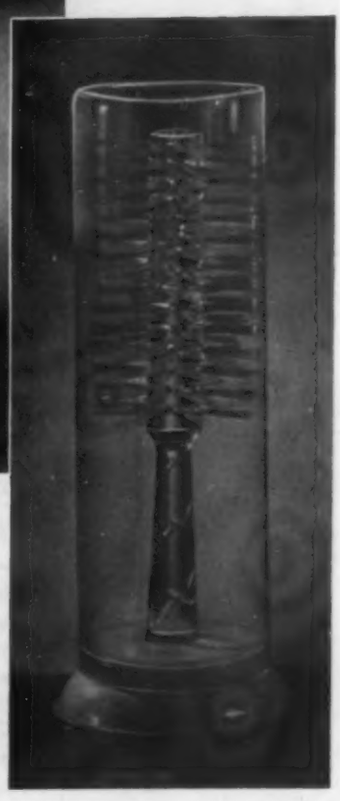
The buyers expressed a desire to work more closely with the industry and asked that molders and fabricators make a more careful study of merchandising problems in developing consumer applications. Greater discretion in end-use applications, they said, might result in some reduction of immediate demand, but would lay a firmer foundation for tomorrow's markets.

Plastic brushes and

THE vogue for brushes having bristles set at various angles has not only brought a demand for plastics in brushes but in brush packages as well. Two brush sets that have come out of this demand are shown here—they utilize a total of four different plastic materials.

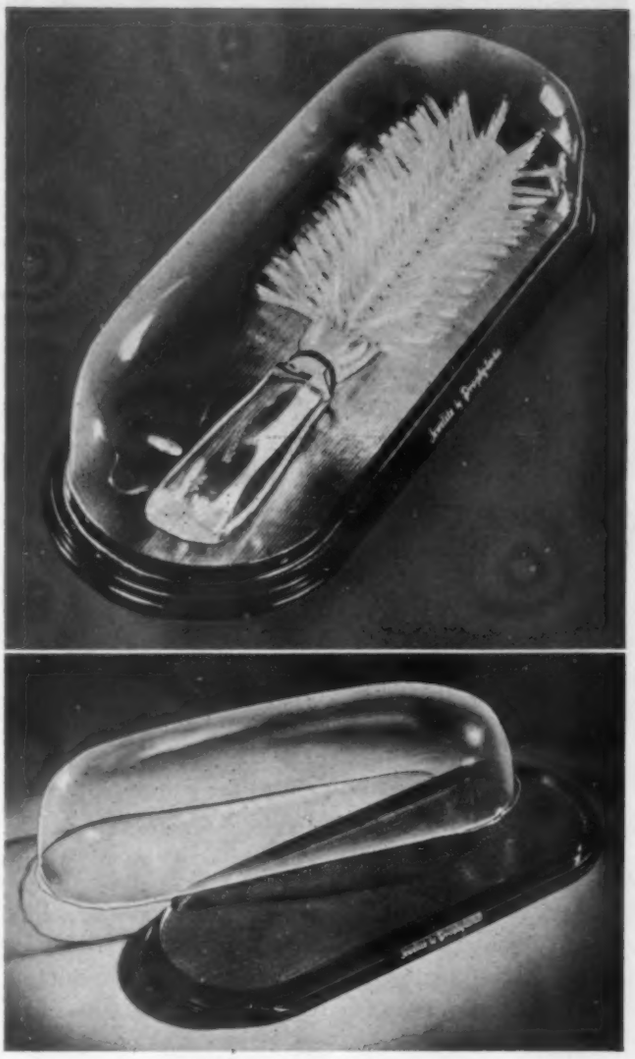
The Jewelite brush set (shown on the opposite page), manufactured and distributed by Pro-phy-lac-tic Brush Co., Florence, Mass., has a Lucite brush back, the handle of which is shaped to fit the grip. Bristles are of Prolon. The container (shown on opposite page) has two plastic parts. Its black phenolic base is actually a molded rim which has a three-fold purpose. Into it is fitted the paperboard platform on which the brush lies; a molded-in groove in the upper edge is used to hold the dome securely; the company and trade name, molded-in and wiped with color, serve as a label for the package. As for the package cover, it is a transparent dome, drawn from cellulose acetate sheet, that allows visi-

The acrylic handle of this all-around bristled brush picks up the design of the spirally set bristles



The brush stands upright in its cellulose acetate package, ready for use on display counters or dressing tables

their packages



Top—This brush is clearly visible in its display package. Bottom—The base of the package consists of a molded phenolic rim which holds a paperboard platform; the dome-shaped cover is drawn from cellulose acetate sheet

bility of the product from all angles as it lies on the store counter.

Empire Brush Works, Port Chester, N. Y., also packages its Spirol brush in cellulose acetate—a package made by the National Transparent Plastics Co., Springfield, Mass. (brush and package on oppisite page).

In this case, however, the transparent top part is a vertical one which displays the all-around bristled brush from every angle. The cellulose acetate base forms a stand for the brush. The complete package is used for display in stores; in the home the brush is stood in the base while not in use. The Spirol brush, that is enhanced by this package, is molded of Lucite and has nylon bristles.

FIGS. 1 THRU 5, COURTESY SHORT WAVE FORMING CO.

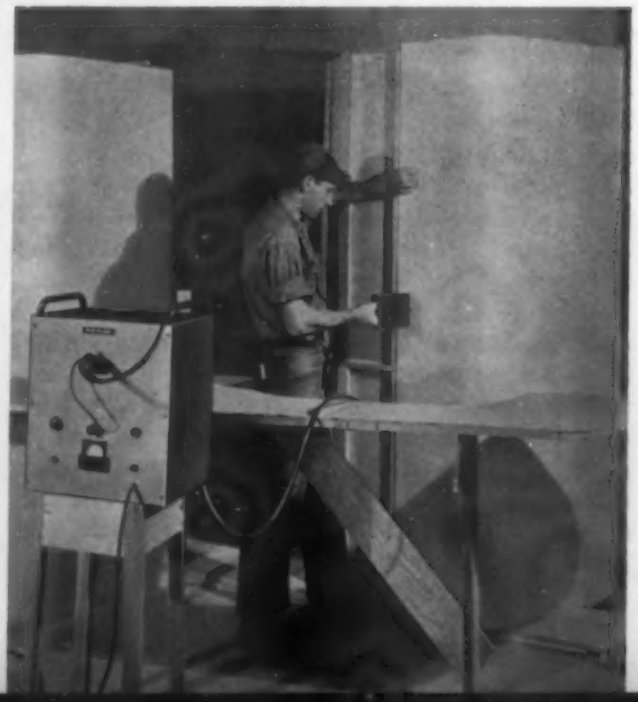
1—Advantage of high-frequency unit is that it eliminates need for electrodes on either side of part to be glued

Portable welder that

UNTIL recently, the use of resin adhesives in certain sections of the woodworking industry has been somewhat restricted by the fact that many manufacturers were too small to afford the equipment necessary for the high frequency curing of the resins.

The Short Wave Plastic Forming Co., of Burbank, Calif., has offered a solution to this difficulty with the introduction of Woodwelder, an electronic machine which eliminates the need for placing electrodes on either side of the part to be glued. The production speed gained by use of high frequency is said to offset

3—Beautiful effects may be achieved with curved plywood panels without resorting to erection of expensive jigs



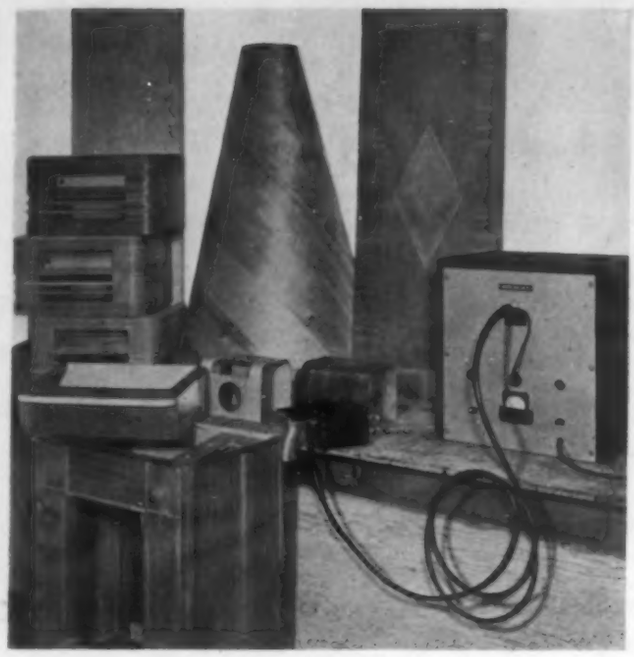
2—The machine makes quick glue curing possible on hardwood walls, on wooden ceiling panels and parquet floor

cures resin adhesives

the higher cost of synthetic adhesives and permit the stronger glue line construction obtainable with such glues as the ureas, phenols, resorcinols, melamines and the furfurals.

With the Woodwelder, the hand gun need only be applied to the face surface to cure the glue line through the stock as far as 1 in. distance from the electrodes. The ultra high-frequency unit transmits the current from an electrode down through the glue line and back up to the other electrode, thus effecting a complete circuit and curing the resin adhesive. Most of these

4—Using the hand gun, an operator is able to glue varicolored wood blocks to sub-flooring in matter of seconds



5—All the high-grade wood products shown here have been assembled by use of synthetic resins and high frequency

adhesives require heat in order to effect a fast cure. This machine is designed to speed up the time lag in the woodworking industry which occurs within such a procedure. It is said that minutes, and often hours, may be reduced to seconds when gluing operations are performed with the machine.

The machine can be used with pressure devices and clamps already developed for a certain job but here the number of clamps required is materially reduced as is the time during which an assembly must remain under pressure. It can also be used to spot cure a given glue at intervals of about 8 to 10 inches. As a result, a normally cold-setting adhesive is held in place by these spot cures without clamps or nails and the remainder of the glue can be allowed to set up in the normal manner. This is particularly desirable when a flat plywood sheet must be bent to a curved shape as erection of expensive jigs for these compound curvatures can be eliminated.

Basically, the Woodwelder consists of two parts—a $^1/_2$ kw. generator and a hand gun. A 12-ft. flexible coaxial cable extends from the portable ultra high-frequency generator to a hand gun. Total weight of the unit is 80 pounds. The $2^1/_4$-lb. hand gun is designed so that any operator can, by pulling a micro switch trigger in the grip handle, polymerize or harden the synthetic resin glue instantly through plywood, solid wood and many other materials. Glue line cure can be effected up to 30 in. in length and 1 in. in width with accessory equipment incorporating automatic loading adjustment to accommodate any given load within dimensions which are stated.

The machine is simple to use and operates on a three-way 110 volt plug. The filament voltage switch is on the right side of the generator front, the manual and split-second timer switch on the left. When the latter

switch reads "off," the gun works with the hand trigger only and the machine is on only as long as the operator's finger is on the trigger. When the switch reads "on," it throws the automatic timer. Turning the knob above the switch counterclockwise increases the time; clockwise, it decreases the time.

The electrodes on the hand gun are placed over the area which has been spread with glue and is ready to weld. Pressure on the gun handle pulls the trigger. The variable control knob on top of the hand gun balances the current to the work. By adjusting the knob to the point where the neon light burns brightest, maximum heat is obtained on the glue joint.

At this point, the milli-ammeter should read 180 or more. Spotting on edge gluing should require about 10 sec. to penetrate through a $^{3}/_{4}$-in. joint. When shooting directly through the wood or panel, a few trials are required to determine the time necessary to set the glue. A great deal, of course, depends upon the type and moisture content of the material being used. Normally, the penetration rate is about $^{3}/_{16}$ in. per second on good dry panel and increases proportionally with amount of moisture.

The applications which can make use of the Woodwelder are many. Furniture manufacturers may now weld mortised and various other types of joints while they are under pressure in an automatic air cylinder clamp. Glue blocks can be welded in place within a few seconds; waterfall design or curved rosettes can be positioned; edge-gluing of core stock may be speeded. Figure 6 shows one end product where the glue was cured with this machine. Since the strength of these motorized gates depended upon the waterproof glue used in bending the plywood veneers together, it was decided to assemble the gates entirely with glue. The panels were bonded to the frame and the grille work glued with Urac 185. No nails were used.

On the repairing end, the former method of raising dents, nicks or marred spots in solid or veneered materials by steaming with a hot iron or by igniting alcohol over the damaged area is now a 10-sec. operation. A few drops of water may be placed on the damaged area, the electrodes placed over the surface and high-frequency energy applied.

6—No nails were required in the construction of this plywood gate. A urea resin adhesive was used instead

PHOTO, COURTESY AMERICAN CYANAMID CO.

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Chemaco Polystyrene places the complete range of the spectrum at your command. Entrust it with the task of producing the clearest, richest, most appealing color and it complies perfectly. Call on it for the purest white . . . the deepest black — and it delivers. Ask it for water clear transparency, delicate translucence or complete opacity and it meets every requirement with ease.

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HIGH FASHION

A display of cellulose acetate hair ornaments, featured in department store window, is evidence of their popularity

STYLING in plastics products pays off, as evidenced by the above photograph of a recent window display at Lord and Taylor's department store in New York City, one of a group that featured nothing but cellulose acetate hair accessories. This display is indicative of the ready buyer acceptance that plastics can have even in today's buyers' market if the articles are created with a knowledge of trends in consumer wants, and with maximum appearance and long wear.

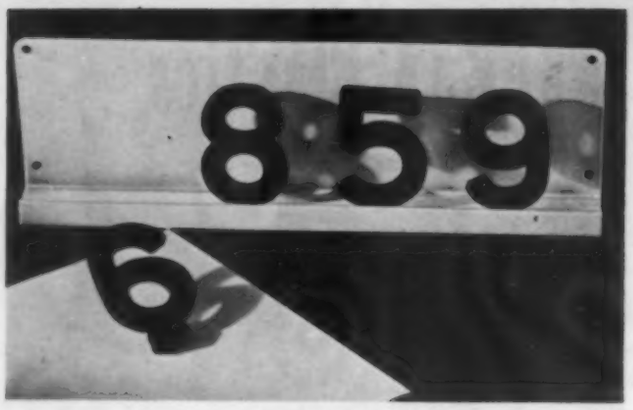
The hair accessories in this instance were created by Ben Hur Products, Inc., of New York City in lustrous simulated tortoise shell. Antiques and hair decorations used in remote regions of the world were the inspiration for most of these designs. Take for example the pins shown at the bottom of the opposite page. Women of the Belgian Congo, carrying slim utensils in the knot atop their heads, created this ornament which consists of two forked Lumarith stick pins set with rhinestones. A Juliet cap, on the other hand, was the basis for the Lumarith ornament shown at the top of the following page. Shaped to the head, the clip holds the hair securely in place. It can be made to complement both evening and daytime clothes. Other styles of hair accessories in this line give evidence of Chinese inspiration or adaptations of medieval armaments.

takes to plastics

A Juliet cap was the basis for the design of this cellulose acetate ornament that fits the shape of the head

Unique hair ornaments used by women in other parts of the world inspire hair decorations such as these stick pins

PHOTOS, COURTESY CELANESE PLASTICS CORP.



Boldly colored molded acrylic house numerals give three dimensional effect and weather resistant identification

Acrylic numbers

TWO years were spent in design and testing before the acrylic and metal house number sets, now being put out by Newmoplastics of Pontiac, Mich., was considered to be ready for the market. The company wanted numbers which would withstand all types of weather conditions for, while some sets might be partially protected by roofs, others would be fully exposed to the elements. The numbers also had to show up clearly at a distance and be attractive on all types of houses.

Two disadvantages were found to numerals attached directly to steps, walls of houses or posts. There was often too little contrast for the figures to show up well and when a house was repainted, the numbers were difficult to remove and so were often painted over.

The solution was found in the use of a white frame which would serve as background and could easily be detached by unscrewing, and boldly colored Lucite numbers that could be set approximately $^1/_2$ in. from the back of the frame and thus give a three-dimensional effect to the sign. This insured greater visibility.

A 24-gage rustproof steel, coated with a white weather-resistant baked enamel, was selected for the frame. It was made large enough to hold five numbers conveniently. Next came the selection of the proper material for the numbers. Sunlight and weather-resistant Lucite in red and blue was the final choice. These are held in place in the frame groove by screws. The acrylic letters are injection molded by Udylite Corp., Detroit, Mich., in a 10-cavity die containing 10 different numbers from 0 to 9. A complete shot weighs 145 grams or approximately 5 ounces. In order to mold the parts strain-free and to avoid later cracking or crazing, the die temperature is maintained at 180° F. This die was designed jointly by Udylite and the Banner Tool Co., also of Detroit. The numbers are packed with a plated fastening screw in a cellophane bag; the frame comes in an individual carton.

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A new industrial

THE extensive research necessary to the development of a new industrial product is exemplified by the "Series 20" grinding wheels, a new type of ceramic or vitrified bonded wheel manufactured by the Carborundum Co. Although the background of basic information had been filled in previously by many years of study of the problems of industrial abrasives, the laboratory phase of the "Series 20" project consumed several additional years before a completely satisfactory wheel was produced.

Recognizing the difficulty of reproducing field conditions in the laboratory, Carborundum engineers next subjected the new wheels to an exhaustive series of tests in more than 400 toolrooms which presented a great diversity of grinding problems and mechanical skills. Included in the tests were such toolroom operations as surface grinding, tool and cutter grinding, and surface and cylindrical grinding of forms. Only after these long years of laboratory and practical industrial research was the product finally deemed ready for the market.

Problems of correlation

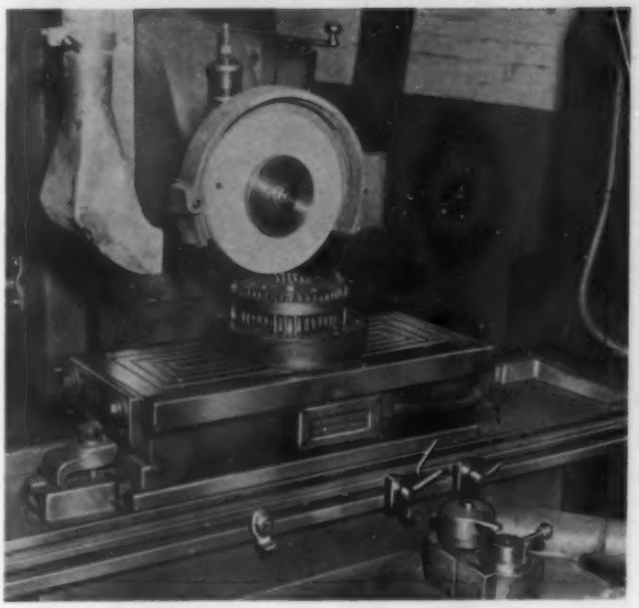
All bonded abrasive products are composed of two basic materials: the abrasive and the bond. The bonding material holds the abrasive grains together and the grade or strength of the wheel depends on the amount, distribution and the physical characteristics of this bonding material.

There are many ceramic bonding materials which give satisfactory bonding strength, but that is not enough. All bonding mediums also possess negative characteristics, chief of which is the tendency to inhibit or interfere with the cutting action of the abrasive grains. The ceramic research problem, therefore, was to evolve a bond with sufficient strength to meet safety requirements and, at the same time, cause a minimum of interference with the efficient cutting action of the abrasive used.

The second major problem was to obtain the best possible correlation of bond, abrasive and structural characteristics to meet the variety of grinding needs in numberless industrial applications. One of the difficulties in the past has been the lack of versatility in grinding wheels, making it necessary for a toolroom to keep on hand a stock of varied wheels for the different jobs to be done. The extensive field tests proved that a narrow pattern of grits and grades will cover a wide range of operations.

From this long and intensive research program came a new grinding wheel design which, the company asserts, permits faster stock removal, smaller inventories, longer tool life between grinds, fewer damaged tools and better tool finishes as well as a cooler cutting action.

grinding wheel

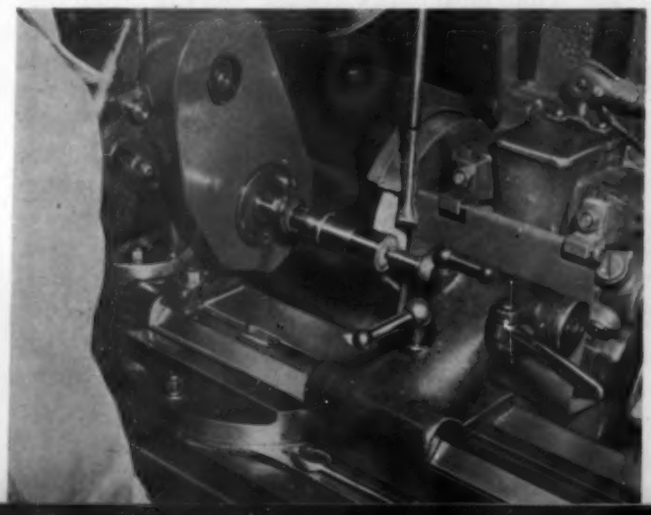


PHOTOS, COURTESY CARBORUNDUM CO.

This versatile grinding wheel cuts down on the stock of wheels needed for various jobs. Here it grinds a punch die

Above—This wheel can also be used to cut a high carbon, high chrome steel blanking die to a depth of 0.010 inch

Below—The wheel, which permits cooler action, is used here in a cylindrical grinding operation on a plug gage



Single hydraulic cylinder in new vertical injection press locks dies together and injects plastics in mold

Vertical injection press

VERTICAL construction, which incorporates the use of a single hydraulic cylinder, characterizes the new vertical plastics injection press just introduced by the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. This arrangement, a departure from conventional horizontal presses, provides for clamping the mold halves together and injecting the plastic material into mold cavity in same stroke of piston rod.

Here is how it works. The piston is hydraulically powered by a self-contained hydraulic unit which forms an integral part of the machine. When the cylinder is activated the piston rod movement operates a toggle mechanism. This initial downward movement of the piston rod locks the die plates together. As the piston rod continues its downward movement, it also serves as a plunger to inject thermoplastic material into the mold. Because this cylinder performs a dual function, overall cycle time is less than that of horizontal machines.

In the past, success in producing plastic parts by

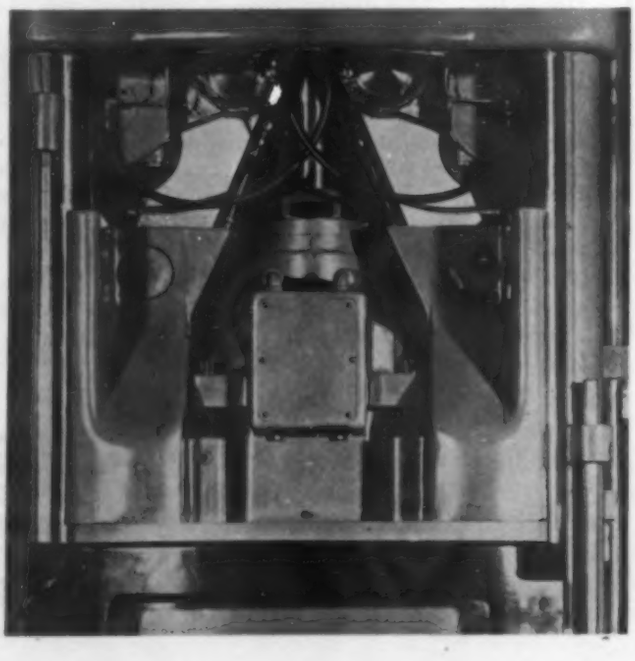
insert molding has been determined largely by holding mechanisms used to prevent inserts from falling or slipping. On horizontal machines with molds mounted vertically, force of gravity has caused difficulty. The vertical construction of the new press eliminates the need for elaborate insert holding devices. This simplifies insert molding and prevents possible mold damage as inserts are held in position by gravity and do not slip or fall.

Another problem has been that of changing heating cylinders. Of prime concern here has been machine down-time, loss of material through purging and difficulty in handling the cylinders. Change-over of heating cylinders on the new machine has been cut to approximately 20 min. through easy accessibility. This feature makes it practical to have a supply of heating cylinders for different plastic materials and colors, has reduced machine down-time and eliminated material loss.

Other structural improvements have been made. These include simplicity of handling molds, for no overhead cranes are needed. Electrical, hydraulic and mechanical devices may be serviced upon removal of two covers. Control stations, including all push buttons and levers, are within reach of the operator. Centralized location makes control of the machine possible from a sitting or standing position. The controls may be set for manual, semi-automatic or automatic operation and maximum safety precautions are provided through interlocked circuits. The machine will stop instantly at point of stroke reached when stop button is depressed.

A full view aluminum and plastic safety gate is provided. This gate is fully automatic not requiring manual opening and closing for each machine cycle.

A close-up of the hydraulic cylinder, heart of this vertical plastics injection press, is pictured below



Books and Booklets

Write directly to the publishers for these booklets. Unless otherwise specified, they will be mailed without charge to executives who request them on business stationery.

Protective Organic Coatings as Engineering Materials

by Joseph J. Mattiello

Published by the American Society for Testing Material, 1916 Race St., Philadelphia 3, Pa., 1946

Price $1.50 **100 pages**

This extensive lecture covers raw materials, oils, resins, pigments, etc., and various finished products including paints, enamels and varnishes, and treats of the uses of coatings in such fields as electrical insulation, luminescent coatings, hot plastic paint, textile and fabric coatings. Illustrations and tables supplement the text.

Molding and Casting

by Carl Dame Clarke

Published by The Standard Arts Press, 2635 N. Calvert St., Baltimore 18, Md., 1946

Price $6.50 **300 pages**

This new revised edition explains in detail the technique of making plaster, wax, agar, celluloid and rubber molds and casts. It contains over a hundred formulae and numerous photographs illustrating the methods and results of various types of molding.

Hydraulic presses—Air-Hydraulics, Inc., 120 W. Middle St., Chelsea, Mich., has brought out a catalog emphasizing the versatility of air-hydraulic presses. A table of models and a list of specifications are included.

Static electricity—The National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass., has published a discussion of static electricity as a fire cause. Prevention of static accumulations by humidification, bonding, grounding and ionization, and the instruments for detecting, measuring and recording static are covered in detail.

Gearex rotary pumps—Sier-Bath Gear & Pump Co., 1019 Broad St., Newark 2, N. J., has followed up the recently introduced Gearex rotary pumps with a factual 2-color catalog. Uses of both models—the internal bearing for lubricating fluids and the external bearing for non-lubricating fluids—are described, with detailed selection data and illustrations.

Infrared—In a publication entitled "Infrared Parade," the Fostoria Pressed Steel Corp. of Fostoria, Ohio, illustrates the multiple uses of their Evenray system. The industries covered by installation photographs and brief descriptions of these infrared systems include textiles, book binding, finish baking and sand molds. Photographs of various infrared models are included.

Industrial models—Stark Industrial Models, 95 Jane St., New York 14, N. Y., has brought out a 4-page pamphlet illustrating four general types of industrial models for use in production planning and merchandising. These types are: marine engine and machinery "mock-ups," working and architectural models. Suggestions are made for adaptations of these models in other industries.

Protective machine guards—Complete safety for machine operators is discussed in a brochure entitled "Plexiglas on Guard." Obtainable from the Rohm & Haas Co., W. Washington Square, Philadelphia, Pa., it illustrates the many applications of transparent Plexiglas as safeguards on abrasive wheels, milling machines, duplicators, etc., states the advantages of acrylic in this type of application and lists the names of firms specializing in commercial production of acrylic guards.

Synthetic rubber—Acadia Synthetic Products, a division of the Western Felt Works, 4115 Ogden Ave., Chicago, Ill., has issued a new booklet giving the results of their laboratories' evaluations of certain synthetic rubber compounds when they have been exposed to various oils, fuels and solvents.

Directory—Research laboratories and other technical facilities available to industry at educational institutions in New York State are listed in a directory published by the New York State Dept. of Commerce, 112 State St., Albany 7, N. Y. This booklet features a chart of facilities for research and laboratory analysis at 26 universities and colleges and 58 technical subjects on which specialized research is available. Of particular interest to the plastics industry are references to chemical research facilities.

Luminescent applications—Both fluorescent and phosphorescent types of applications are covered in a pamphlet released by The New Jersey Zinc Co., 160 Front St., New York 7, N. Y. Emphasis is placed upon the use of luminescent pigments as paints, plastics, papers, printing inks, decals, silk screen printing paints and porcelain.

Portable grinder and handtool—The "Precise 40" portable handtool and grinder, built for high-speed precision work on plastics, rubber, wood, bronze, etc., is covered in a folder published by Precise Products Co., 1328–30 Clark St., Racine, Wis. Uses include grinding, milling, deburring and polishing.

Penacolite adhesive G-1215—Pennsylvania Coal Products Co., Petrolia, Pa., has released an instruction sheet containing property, spreading and curing data on its Penacolite G-1215 room-temperature setting adhesive.

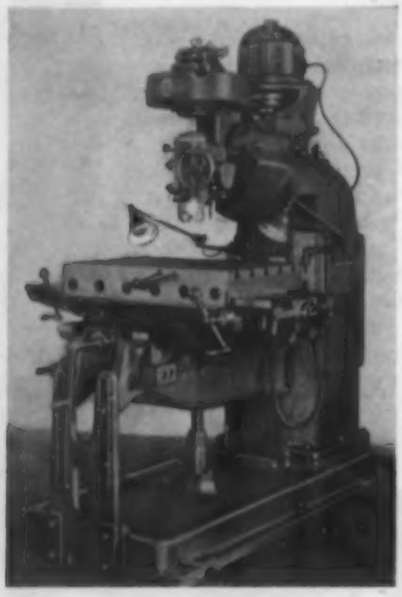
Induction motors—Bulletins C-118 and C-125 published by Reliance Electric & Engineering Co., 1076 Ivanhoe Rd., Cleveland 10, Ohio, cover protected (open type) frame sizes 203 to 326 motors and totally enclosed fan-cooled motors. The former booklet explains the construction details of the motors, including all-steel frames, welded cores, aluminum pressure-cast rotors and the new Reliance precision bearing mount. Bulletin C-125 deals with squirrel-cage frame sizes 224 to 326 for two and three phase AC circuits.

Silicone compound—DC Antifoam A, the new Dow Corning silicone compound developed for killing foam in aqueous systems, is thoroughly covered in a recent pamphlet. Also included is a list of the industries in which Antifoam A has been established. A copy of pamphlet may be obtained from The Dow Corning Corp., Midland, Mich.

Flatting agents for Geon latex coatings—Many applications demand a flat dull coated surface rather than the high gloss inherent in Geon latex coatings. Bulletin 47-L1, obtainable from B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, Ohio, evaluates a series of flatting agents according to their flatting properties and their effect on stainproofness of the coating.

New Machinery and Equipment

Vertical milling machine—Reed-Prentice Corp., Worcester 4, Mass., is offering a new heavy duty milling machine suitable for high speed milling, routing and die sinking work. It is suitable for work on plastic and rubber molds, die casting dies and forge dies. The head is securely bolted to the ram resulting in maximum overhang and maximum rigidity, thus providing a firm strong support for the spindle. Large diameter spindle has positive key drive for cutters and arbors. Drive is closer to cutter eliminating tortional deflection. Vertical movement of the spindle is through a quill having a longer bearing in the head. The machine is powered by a 3 hp., 1200 r.p.m., 60 cycle motor or 3 hp., 1000 r.p.m., 50 cycle motor mounted on the ram. Drive to the spindle is by V belt direct from motor spindle Ten speeds may be obtained with open belt within the range of 400 to 2600 r.p.m. and five speeds may be obtained with back gears within the range of 133 to 320 r.p.m. Other specifications include: longitudinal feed, 27 in.; cross feed, 20 in.; vertical travel of spindle, 5 in.; maximum distance, spindle to table, 20 inches. The work table measures 32 by 22 by 4 inches.



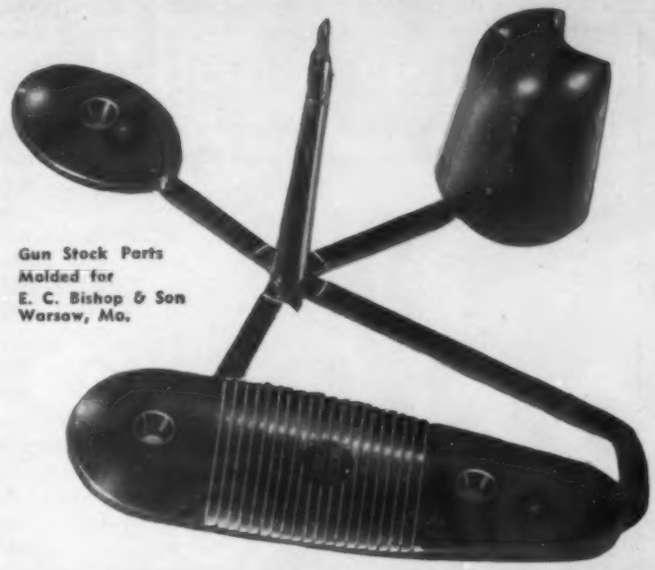
Hydraulic pallet truck with plastic wheels—Plastic wheels may be substituted for the standard metal wheels at the end of the forks as well as at the front of a multiple stroke hydraulic pallet truck recently introduced by Lewis-Shepard Products, Inc., 328 Walnut St., Watertown 72, Mass. This is said to reduce wear on floor surfaces. The truck is equipped with "spring-lift" booster rollers, mounted in back of the rear wheels, which eliminate bumps caused by the ordinary series of small fixed rollers and obviate the need for chamfering of boards. The hydraulic lift is operated through a selective length stroke double foot pedal permitting operation from either side of the truck. It is built in capacities ranging from 1000 to 6000 lb. and is adaptable to either single or double, two- or four-way pallets.

Machine for cutting vinyl sheeting—Development and Design Inc., 720 Beacon St., Boston 15, Mass., has announced a new machine for cutting vinyl sheeting to size. This machine feeds vinyl of various thicknesses up to approximately 40 gage automatically from rolls up to 24 in. in width and cuts the sheets automatically to any desired length. It operates at a speed of 16 cuts per minute on a piece 42 in. long. It is electrically air operated and operates from 110-volt lighting line.

Hydraulic accumulator—Greer Hydraulics, Inc., 454 18th St., Brooklyn 15, N. Y., has announced a new design full-flow hydraulic accumulator for industrial application. It may be used with holding, pressing, feeding and cutting equipment, with pressure regulators, as a booster and surge chamber, as an emergency source of power, as a source of stored energy, as a dispenser of fluids, etc. This accumulator makes use of a one piece, seamless steel shell enclosing an air bladder of special natural rubber or synthetic rubber depending upon the type of fluid used in the system. The bladder incorporates an integrally molded high-pressure automotive type air valve on one end for preloading with air pressure and an integrally molded conical-shaped metal plug on the other end for sealing the shell at the end of the oil discharge cycle. This plug eliminates direct contact between the bladder and outlet plug and is said to preclude bag failure due to pick-out of the bag from the perforated plug. The bladder will withstand operating temperatures of from −65° F. to 160° F. and working pressures up to 3000 p.s.i. This accumulator is cylindrical in shape and obtainable in six standard sizes: 10 cu. in., 1 qt., 1 gal., $2^1/_2$ gal., 5 gal. and 10 gallons. It has a volumetric efficiency of 97 percent.

Surface sander—Barron Tool Co., Inc., 415 Brainard St., Detroit 1, Mich., has introduced a 4-in. rotary surface sander designed for drill press and flexible shaft. For surface sanding plastics, wood or metallic surfaces, it finishes flush with shoulders of workpiece. The housing is cast aluminum equipped with a hardened and centerless ground $^1/_2$-in. steel arbor and features a $^3/_8$-in. thick sponge rubber pad bonded to the metal to cushion sanding operations and to permit instant application or removal of sanding disks. Synthetic adhesive is furnished with each sander. The sander is said to provide a velvet smooth finish with no evidence of ripples, steps or striations. It operates in any drill press having spindle speed of 1725 to 5500 r.p.m. and $^1/_2$-in. chuck, collet or spindle adapter.

Air-driven attachment—Vulcanaire, a high speed air-driven attachment which converts jig borers and other machine tools into precision jig grinders, has been perfected by the Vulcan Tool Co., 730 Lorain Ave., Dayton 10, Ohio. This attachment is equipped with an adaptor that fits into the chuck of any machine tool when the operation requires precision jig grinding. It has controllable speeds ranging from 30,000 to 75,000 r.p.m. From 4 to 8 cu. ft. of air per minute is required for complete speed



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range. The unit is $2^1/_2$ in. in maximum diameter. Precision grinding of holes from $^1/_{16}$ to $1^1/_2$ in. can be accomplished. The Vulcanaire is also produced in models for adapting lathes, milling machines and internal and surface grinders for other high speed precision grinding.

Centerless wet belt grinder—Porter-Cable Machine Co. of Syracuse, N. Y., has introduced a centerless wet belt grinder which is adapted for thru work, pieces $^3/_4$ in. to 2 ft. lengths, and longer with proper supports. Diameters handled range from $^3/_{32}$ to $2^1/_4$ inches. An endless abrasive belt operates over a resilient contact roll. Since the abrasive belt and contact roll are balanced, the two cut uniformly. Work is done by the abrasive belt, therefore, the contact roll gets little, if any, wear. Since the grinding unit maintains balance and contact roll remains flat and square, setting up is simplified.

When a belt breaks, it simply drops off the machine. Grinding is done below center to avoid throwing work out of the machine.

Bench-type fatigue testing machine—The Baldwin Locomotive Works, Philadelphia 54, Pa., has introduced the Sonntag Model SF-2, a bench-type fatigue testing machine with a constant-force loading feature. The machine affords flexure fatigue tests on sheet stock of any material—metal, plastic, wood—and requires no attention during the test. A revolving eccentric mass is used to load specimen, avoiding cams or eccentric connecting rods which require readjustment during the test as the stiffness of the specimen changes. With the dynamic testing possible with this machine, the specimen undergoes the same stresses the material would sustain in actual use. The machine which is 15 by 12 by 32 in. can be placed in a cabinet during a test so that temperature and humidity can be controlled. It weighs 115 lb., has an alternating force capacity of 20 lb. and a speed of 1800 cycles per min. with total travel of loading yoke 1 in. per cycle.

Relief valve—The Superdraulic Corp. of Dearborn, Mich., has announced a new 5000 p.s.i. relief valve which is said to eliminate the squealing and chatter often associated with this type of equipment. Instantaneous action prevents objectional pressure peaks. Accurate maintenance of pressure setting is said to be an important feature. Provision is made for remote control.

Material handling trucks—The California Pallet Div. of Tobey International Co., 7005 S. Western Ave., Los Angeles, Calif., has recently introduced material handling trucks available in three sizes. Truck weights range from 68 lb. for a 24 by 48-in. truck with 6-in. wheels, to 130 lb. for the 36 in. by 72-in. model with 12-in. wheels. Easy rolling load rating for all models is 2000 to 5000 lb. depending upon caster size. The truck bed is of high-tensile aluminum alloy extrusions and is sufficiently flexible always to support the load on four wheels, regardless of rough floor surfaces. The wheels of aluminum alloy are equipped with thrust and roller bearings, shake-proof king pin, elastic stop nuts and cured-on solid rubber tires. (*Please turn to next page*)

Coaxial cable furnished by Federal Telephone and Radio Corporation

–plasticize your vinyl compounds with Paraplex G-25

When unvarying quality and permanence are essential in your vinyl compounds, count on PARAPLEX G-25!

A typical instance: in coaxial cable produced by Federal Telephone and Radio Corporation, PARAPLEX G-25 is used because this resinous plasticizer is non-migrating. This property prevents contamination of the insulation, which would affect the properties of these highly specialized cables.

Other advantages of PARAPLEX G-25 are excellent ultra-violet resistance, high-temperature stability, low flammability and ease of processing, particularly on stocks, both extruded and calendered, where a high finish is desired.

If you are working with vinyl compounds, you'll want to know more about PARAPLEX G-25 . . . and about the MONOPLEX group of ester plasticizers.

Complete information will be sent to you upon request.

PARAPLEX *is a trade-mark, Reg. U. S. Pat. Off.*

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THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Knee and column type miller—Cincinnati Milling & Grinding Machines, Inc., Cincinnati 9, Ohio, has introduced No. 2 ML knee and column type milling machine as a companion machine to No. 2 MI, announced some months ago. Driven by a 3 hp. motor, the new machine is about 1000 lb. lighter than the No. 2 MI. It has speed and feed ratios of 60 to 1 and 120 to 1, respectively, and 16 spindle speeds, ranging from 25 to 1500 r.p.m., changed with a single crank-type control at the side of the column. Feed rates are changed in the same manner as the speeds—one-half turn of a single crank-type control, throughout the complete range of 16 feeds, from $^1/_4$ to 30 in. per minute. "Live" rapid traverse, at the rate of 150 in. per minute longitudinal and cross, and 75 in. per minute vertical, may be engaged through a lever control at the side of the knee.

Hole locator and bench filer machine—The DoALL Co., 254 N. Laurel Ave., Des Plaines, Ill., has announced a precision hole locator and an improved bench filer machine for filing, sawing and honing operations. This bench filer machine, shown below, incorporates the patented universal joint clamp which assures a 100 percent vertical file position despite warped or twisted file shanks. An overarm backup roller gives support to the tool. The tilting table is $10^3/_8$ by $10^3/_8$ inches. The machine has a $1^1/_2$-in. stroke and a file shank capacity of $^1/_8$ to $^3/_8$ inch. This unit is powered by a $^1/_4$ hp., 110 volt, 1724 r.p.m., AC motor which provides approximately 350 strokes per minute.

With the hole locator, holes can be located and drilled on an ordinary drill press with an accuracy approaching that obtained on a jig borer. The unit consists of two arms of hardened and ground tool steel at right angles to each other within 30 sec. of arc. A vernier stop slides on each of the arms which are graduated for 6 inches. The verniers are set to a reading of less than 0.001. The center punch is made of hardened tool steel ground to fit the $^1/_4$-in. drill bushing. The point is ground to 120° included angle so that when centers are punched with it the bottom of the punch mark guides the drill when standard drills with 118° included angle are used.

Spring tension clamp—A spring tension clamp which, it is said, can be applied in one-tenth the time required for ordinary screw clamps has been developed by Aircraft Tools, Inc., 2306 E. 38th St., Los Angeles 11, Calif. It is especially effective for skin, wood, plastic or metal fabrication and template layout. Using a special steel spring, the clamp may be adjusted to secure up to 70 lb. pressure. Pressure up to 100 lb. may be had by the use of a special spring. This clamp is available in three standard sizes and may be ordered in special dimensions to fit job requirements.

Laboratory and small production furnace—K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago 37, Ill., has announced Model 9A de luxe, a new medium size laboratory furnace with built-in automatic temperature controls. With over-all dimensions of 19 by $20^1/_2$ by $21^1/_4$ in., the furnace is said to maintain any desired temperature automatically between 250 and 1900° F., and reaches a maximum of 2000° F. The heating unit consumes 2000 watts at 110 volts (AC only) and is constructed of heavy gage special alloy wire.

News of the Industry

Stunned by the Texas City disaster the entire plastics industry shares with Monsanto and the families of those who lost their lives in their mourning for the victims of probably the worst tragedy in the chemical industry's history. The effect on the polystyrene branch of the plastics industry is as yet undetermined. In a wire to this magazine, F. A. Abbiati, general sales manager for Monsanto's Plastics Div. said, "Until we know what styrene monomer may be available from other sources, it is impossible to estimate the effect of this loss on polystyrene production. Enough monomer is on hand or in shipment for us to continue polystyrene production for a short time at the Springfield polymerization plant." He quoted president William Rand as saying the monomer plant at Texas City would be rebuilt on its present site as soon as possible.

The monomer plant, built by the Government early in the war and operated by Monsanto, was purchased by the company in August 1946 with a government rated capacity of 50,000 tons annually but reported to be capable of almost twice that capacity if necessary. An adjacent polystyrene plant, also destroyed, was just getting into production. To date, practically all of Monsanto's polystyrene production has come from the Springfield, Mass., plant with Texas City supplying the greater part of the monomer. It has been estimated that the total styrene monomer capacity by Dow, Monsanto and Koppers was equal to at least 200,000 tons, but by far the greatest portion was allocated to synthetic rubber. Tariff commission figures indicated a 1946 styrene production of 185,000 tons exclusive of the Dow private plant and Canadian sources. Polystyrene production figures for January and February 1947 were running around 7,000,000 lb. monthly.

At press time for this magazine, it was impossible to ascertain what would happen to polystyrene production. Dow Chemical Co. is steadily increasing production; Bakelite is coming along fast with their announced goal of 25,000,000 lb. annually, but Koppers does not expect production on a large scale until late 1947. It is assumed that greater availability of natural rubber may make it possible to divert some of the styrene now used for GR-S to polystyrene and it is possible the closed government plant at Institute, W. Va., may be reopened for monomer production.

Union Carbide and Carbon Corp. also has an organic chemical plant at Texas City plus a new vinyl resin plant under construction, but no major damage has been reported to either at this date.

Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., has introduced Durez 240 resin which has a melting point between 160 and 170° C., bodies soft oils rapidly and makes varnishes that dry to rich gloss with good flexibility. It is capable of entering into the reaction in the preparation of an alkyd resin and in industrial finishes its action is claimed to be outstanding. It will produce good gloss ink vehicles by decreasing penetration into the paper stock and may be blended with carnauba and candelilla waxes in order to produce wax bases for self-polishing emulsion waxes.

Bakelite Corp., 300 Madison Ave., New York City, is now making available for commercial use a vinyl resin-base wash primer. This primer serves as a metal surface conditioning agent to replace the conventional inhibitive wash coat and as a priming coat capable of giving temporary protection to metal between the interval of metal preparation and paint application. It is a solution of Vinylite brand resin XYHL in alcohol, pigmented with a relatively insoluble zinc chromate. Phosphoric acid is reacted with this solution to produce a complex material. Optimum film thickness ranges from 0.3 to 0.5 mils. An excellent bond is said to be obtainable between the wash primer and subsequent coats of conventional paints such as those based on certain vinyls, phenolic, alkyd resins or nitrocellulose. The primer may be applied by spray, brush or dip.

U. S. Stoneware Co., Akron, Ohio, announces the development and availability of Tygoflex 60, a new Tygon liquid formulation, a 100 percent solid material containing no volatiles such as water, solvents, reducers and thinners. Tygoflex converts, by fusion—350 to 380° F.—to a tough, flexible thermoplastic resembling a glossy rubber compound of medium hardness. It may be used as a coating material, dip solution, molding compound, casting material and as a material for the production of supported or non-supported films by knife or roller coats or the usual spreading techniques.

Gypsy Dyes, Inc., 1414 S. Wabash Ave., Chicago, Ill., is offering dyes for coloring cast or molded acrylic, cast phenolic, acetate, nitrate and butyrate. Colors are applied by a cold dip without involved chemical processes and, according to the company, shades can be matched and controlled regardless of the thickness of the material. Articles may be dyed before or after fabrication and dye solutions may be reused by storing in tightly closed containers.

Centro Research Laboratories, Inc., Briarcliff Manor, N. Y., is now offering 48 synthetic resin solutions which can be used for preliminary laboratory evaluations. The characteristics and formulae are said to be especially valuable to those concerned with the practical use of synthetic resins, varnishes, lacquers or coatings. The solutions are packed in a container of approximately three pints labeled with the formula showing percent solids, viscosity, application data, etc.

Carbide and Carbon Chemicals Corp., 30 E. 42nd St., New York City, has revealed that construction of a new research center is now underway at South Charleston, W. Va. The center will replace existing facilities and will house the fundamental research activities pertaining to the new organic chemical and resin producing process.

(For additional news turn to next page)

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The Chemical Section of the War Assets Administration, 505 N. Seventh St., St. Louis, Mo., is now offering the following surplus plastics: celluloid, cellulose acetate, Flexseal, laminated methyl methacrylate, Butacite, Textolite and other phenol formaldehyde sheets of various sizes; Bakelite rods, tubes and bars; fiber rods and tubes of various sizes.

Wailes Dove-Hermiston Corp., of Westfield, N. J., a subsidiary of **Koppers Co., Inc.,** has developed Bituplastic, a new type of black, cold-applied protective coating. It is a dispersion in water of highly-refined plastic coal tar pitch and other materials. It can be applied to damp surfaces by brush or spray and dries in from 15 min. to 2 hours under average conditions. It is said to be virtually incombustible, does not alligator in sunlight, has no melting point and does not sag or flow at temperatures which are below 500° F.

Owens-Corning Fiberglas Corp., Toledo, Ohio, has announced Fiberglas reinforcing mat, Code T36, a new mat for use as reinforcement in the manufacture of laminated plastics products and in the production of flat plastics sheets. It is formed of cut lengths of glass textile fibers bonded with a resin. The mat is pliable, without fluffiness, and retains the strand integrity of the fibrous bundle. Weight is 1 oz. per sq. ft. Two types are available. T36M is bonded with a thermoplastic resin compatible with the polyester laminating resins. T36K is bonded with a thermosetting resin compatible with phenolic and melamine laminating resins.

The Texas Co., 135 E. 42nd St., New York City, has established a fellowship at Northwestern University for the study of the fundamentals of thiophene chemistry.

Stokes Molded Products, Inc., is the new name of **Jos. Stokes Rubber Co.,** 220 Taylor St., Trenton 4, N. J.

The Pantasote Corp., 444 Madison Ave., New York City, has announced that its new unsupported virgin vinyl Pantex and its virgin vinyl coated fabric Wynsote are now in complete production.

The Polytechnic Institute of Brooklyn is now accepting applications for the du Pont postgraduate fellowship in chemistry for the 1947–48 academic year. This fellowship provides for the tuition and laboratory fees with a stipend of $1200 for a single man and $1800 for a married man.

Arapahoe Chemicals, Inc., Boulder, Colo., is offering research quantities of four derivatives of thiophene. The new products include 2-Chloromethylthiophene, 2-Thiophenealdehyde, Thiophene-2-carboxylic acid and 2-Thienyl magnesium bromide.

The Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh, Pa., has announced a $500,000 expansion program at the company's paint and varnish manufacturing plant in Houston, Texas. Total floor space will be doubled to 120,000 sq. feet, thereby doubling the plant output. A new control and development laboratory to serve southwestern territory will also be built.

Vernon H. Craggs, Inc., is the new name of Vernon H. Craggs & Co., 330 N. Charles St., Baltimore 1, Md. The personnel of this industrial engineering firm remains the same.

Leo H. Rich, Inc., industrial consultants, has been organized by Leo H. Rich with offices at 1 Wall St., New York City. The company will offer a three-point "package program" of correlated economic and marketing research, industrial design and public relations.

(*Please turn to next page*)

Personnel changes

Norman C. Irion, former director of purchases for American Type Founders, Inc., 200 Elmora Ave., Elizabeth, N. J., has been named general manager of Daystrom Laminates, Inc., of Daystrom, N. C. The plant manufactures hardwood plywood products and is an ATF associate.

Dwight M. Wilkinson, formerly chief engineer of Industrial Ovens, Inc., has been named president of Ovens for Industry, Inc., 2032 W. 105th St., Cleveland 2, Ohio.

Dr. H. S. Sutherland, formerly general sales manager, has been appointed vice-president in charge of sales, Shawinigan Chemicals Ltd., Power Building, Montreal 1, Quebec.

It is with regret that we announce the death of **Ralph J. Andrews,** vice-president in charge of research for Wilson Carbon Co., Inc., 60 East 42nd St., New York City. Mr. Andres died March 3 at Aruba, N. W. I.

E. W. Heffernan has been appointed manager of the new Philadelphia sales and service office, 424 W. Olney Ave., of Wheelco Instruments Co., Chicago, Ill.

Dr. Frederic L. Matthews has been appointed associate director of research of Monsanto's Merrimac Div. at Everett, Mass.

Harry E. Davies, formerly a factory manager for Hannifin Corp.' has become manager and vice-president of Bridgman Castings, Inc., of Bridgman, Mich., a subsidiary of Hannifin.

Dr. Charles A. Thomas, vice-president and technical director of Monsanto Chemical Co., St. Louis 4, Mo., has been awarded the 1947 Industrial Research Institute Medal for his contributions to the administration and management of industrial research. The medal will be presented June 5 during the annual meeting of the Institute at Swampscott, Mass.

Col. Edwin L. Hobson of Monsanto Chemical Co. has been appointed chairman, Technical Committee of Packaging Institute.

George C. Smullen, former assistant to the president of Muralco Co., Inc., and head of the Paint, Varnish and Lacquer unit of WPB during the war, has joined the staff of the Casein Co. of America, Div., Borden Co., 350 Madison Ave., New York, N. Y.

Lawrence Brown, formerly chief of the Chemicals Div. of CPA and assistant director of the Chemicals Bureau of WPB, is now assistant to the president of Publicker Industries, Inc., 1429 Walnut St., Philadelphia 2, Pa., manufacturers of chemicals.

Edward Hazlehurst has been appointed technical director of the Pantasote Co., 444 Madison Ave., New York City. He will make his headquarters at the Passaic, N. J., plant.

James N. Mason, vice-president in charge of manufacturing O'Sullivan Rubber Corp., Winchester, Va., has been elected executive vice-president of the company.

Theodore C. Jensen has been appointed superintendent of paint and enamel manufacture and **Frank H. Russell** superintendent of vehicle manufacture for the New Springdale, Pa., paint plant of Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh, Pa.

Plastics Products Addresses
(pages 120 through 123)

Acme Plastic Hanger Co., 378 Throop Ave., Brooklyn, N. Y.
Ayvad Water-Wings, Inc., Hoboken, N. J.
J. E. Barron & Associates, 228 W. 7th St., Cincinnati, Ohio
Arnold Brilhart, Ltd., Old Country Rd., Mineola, L. I., N. Y.
John M. Hart Co., Inc., Graybar Bldg., New York City
Jewel Radio Corp., 583 Sixth Ave., New York City
Keyes Fibre Co., Waterville, Mass.
Majestic Molded Products, Inc., 22-01 41st Ave., Long Island City, N. Y.
Michigan Molded Plastics, Inc., "G" & Baker Sts., Dexter, Mich.
Mi-Co Meter Co., 231 Court St., Covington, Ky.
Nappe-Smith Mfg. Co., Southard Ave., Farmingdale, N. J.
Nixon Nitration Works, Nixon, N. J.
Nu Products, Inc., Constantine, Mich.
Para-Mount Mfg. Co., Lampeter, Pa.
Potter and Brumfield Sales Co., 549 W. Washington Blvd., Chicago 6, Ill.
V. F. Rogers, Denver, Colorado
Ross-Frederick Corp., Old Country Rd., Mineola, L. I., N. Y.
Sioux Falls Plastic Co., Sioux Falls, So. Dakota
Superior Plastics Div. of Westchester Chemical Corp., 426 N. Oakley Blvd., Chicago 14, Ill.
Tupper Plastics, Inc., Farnumsville, Mass.

Stock Mold Addresses
(page 168)

1743–47 Emeloid Co., 287 Laurel Ave., Arlington, N. J.
1748–51 Almac Plastics, Inc., 230 Fifth Ave., New York City

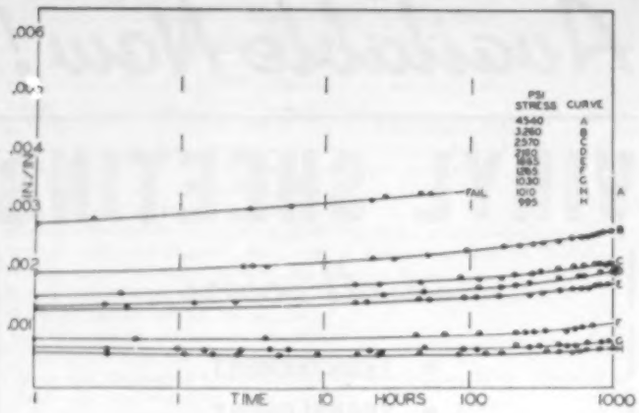
Creep properties

(*Continued from page 152*) was measured with a universal testing machine of 60,000 lb. capacity in accordance with standard A.S.T.M. procedure. The short time static flexural strength tests were also conducted on the universal testing machine. A special jig was used to hold the standard repeated flexural stress specimen so it was loaded as a cantilever beam.

The method of conducting the creep tests on the cellulose filled and asbestos filled melamine materials is the same as that used for the phenolic materials.[4] The rack for supporting the test specimens was located in a conditioned room (77° F. and 50 percent R.H.). The specimens were loaded in suitable increments to the preselected stress in 6 min. or less and strain readings were taken following the addition of each increment. This was done to obtain modulus data on the materials tested. Thereafter, strain readings were taken at intervals for the duration of the test.

The long time tensile strength tests were carried out at the same conditions and on the same racks used for the creep tests. In conducting a test of this nature, it is necessary to limit the test duration to some finite time; therefore, a limit of 1000 hr. under load was chosen arbitrarily to determine the tensile stress below which no practical danger of failure exists for an extended period of time. Each specimen was loaded to the assigned stress in less than 20 seconds. A record was kept of time specimens held up under load.

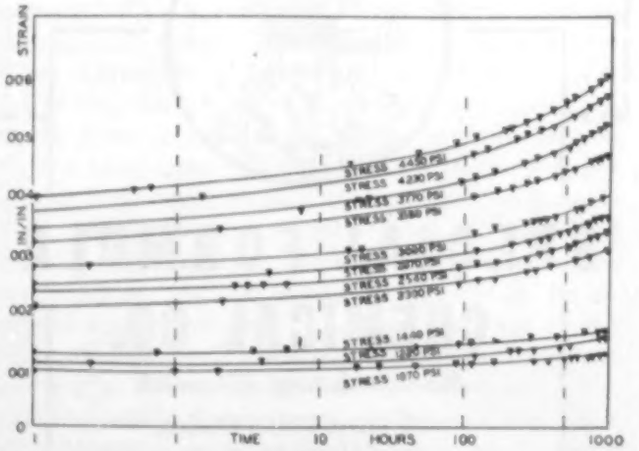
The dynamic fatigue tests on the woodflour filled phenolic and the cellulose filled melamine plastics were carried out in accordance with A.S.T.M. D 671–42 T, which involves subjecting the specimen to a constant



1—*Creep of melamine material, asbestos filled, 25° C., 50 percent relative humidity*

bending amplitude. All tests were run at zero mean stress. Dynamometer and revolution counter readings were taken at the beginning of each test and at 24 hr. intervals thereafter for the duration of the test. Temperature measurements were taken at the test section, stressed to the endurance limit value, for one run with each material.

The tensile creep data for the asbestos filled and cellulose filled melamine compositions are shown plotted on a semilog scale in Figs. 1 and 2, respectively. The cellulose filled melamine and woodflour filled phenolic[4] materials exhibit essentially the same total creep characteristics in the stress range of 0–2500 p.s.i. (Fig. 3, page 240). Beyond 2500 p.s.i., however, it is difficult to obtain creep data for the woodflour filled phenolic material inasmuch as its long time strength is of the order of 2000–2500 p.s.i. The total creep values for the asbestos filled melamine and phenolic materials are of the same order of magnitude at a given stress. It is not possible as yet to make a more definite statement due to the meager amount of data available on the asbestos filled phenolic material. The total creep for asbestos filled phenolic and melamine is lower than that for the cellulose filled mel-



2—*Creep of melamine material, cellulose filled, 25° C., 50 percent relative humidity*

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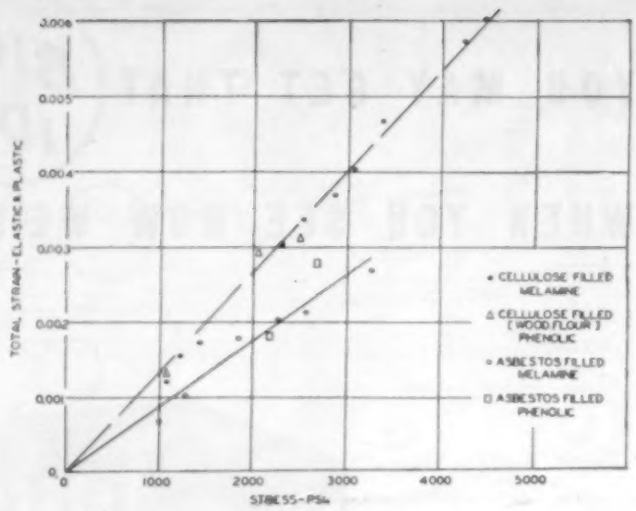


3—This diagram shows total creep at 1000 hours

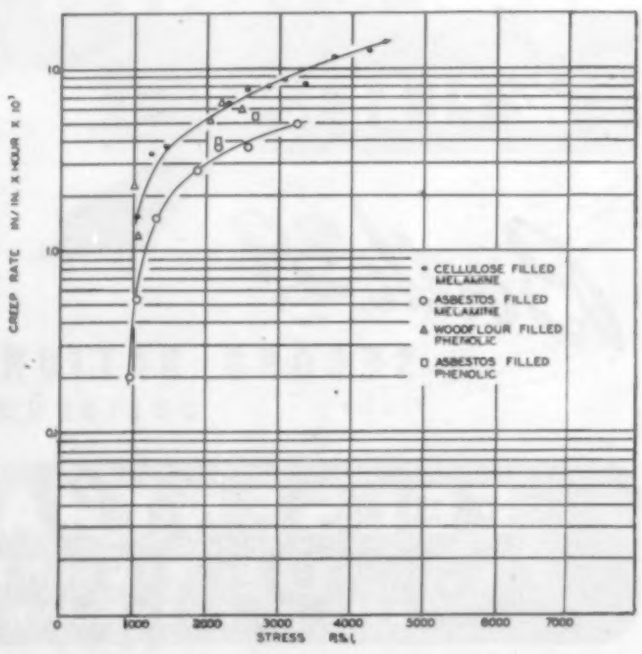
amine and woodflour filled phenolic materials by approximately one-third.

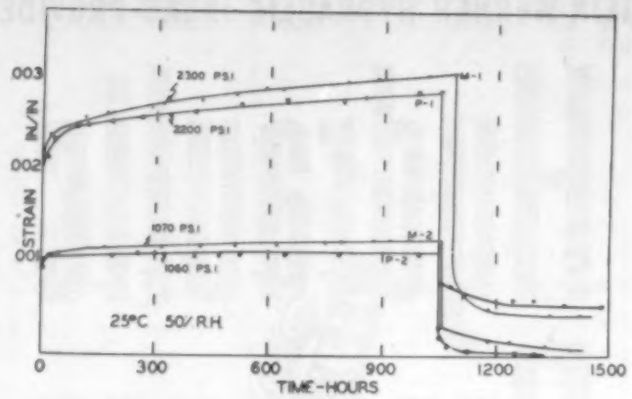
Creep rates at 500 hr. are shown plotted in Fig. 4. Once again, there is close agreement between the behavior of cellulose filled melamine and the woodflour filled phenolic. The rate for the asbestos filled melamine plastic is about 40 percent lower than for the corresponding cellulose filled stock. The two values for asbestos filled phenolic are higher than for the corresponding melamine material, but it would be well to have more data before drawing definite conclusions concerning this.

The creep and recovery data seem to indicate little if any difference between the phenolic and melamine materials. These data are shown plotted in Figs. 5 and 6 (page 242).

The long time tensile strength for woodflour filled

4—Creep rate, 500 hr., 25° C., 50 percent relative humidity



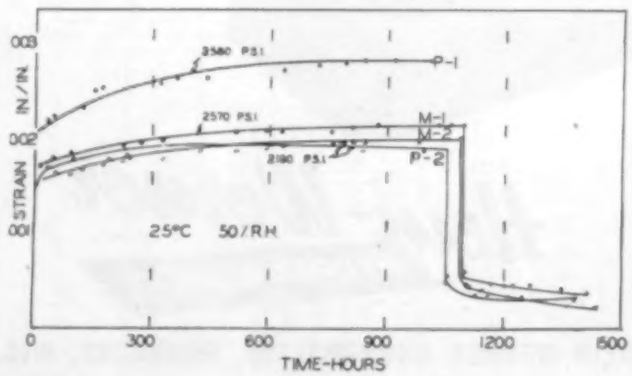


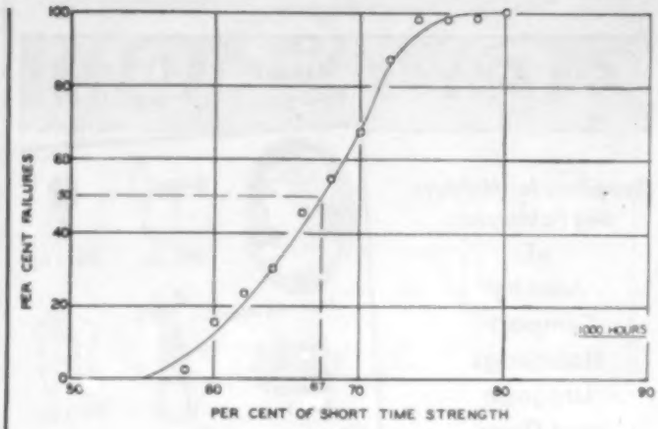
5—Creep and recovery of melamine and phenolic materials, cellulose filled

phenolic was estimated from a semilog plot of stress vs. time in a manner similar to the determination of the endurance limit from a stress-cycles plot. The value thus determined was of the order of 36 percent of the short time tensile strength. The long time tensile strength data on the cellulose filled melamine could have been treated in the same manner. However, it was felt that it would be desirable to obtain a statistical log mean average value for the long time strength, inasmuch as data were available on a greater number of specimens. A plot (Fig. 7, page 244) was made of percent of short time strength vs. percent failed in a given time interval (percent having short time strength less than scale value), i.e., a cumulative frequency distribution curve. The statistical mean long time strength was determined from this curve by noting the strength value that caused half of the specimens to fail. This value is of the order of 67 percent of the short time tensile strength. Long time strength values for several plastics are given in Table II (page 152).

The fatigue or endurance limit in flexure for wood-flour filled phenolic is about 4000 p.s.i. while the corresponding value for the cellulose filled melamine plastic is almost 1000 p.s.i. less (Fig. 8, page 244). Data for phenolic specimens show very little scatter as contrasted with

6—Creep and recovery of melamine and phenolic materials, asbestos filled





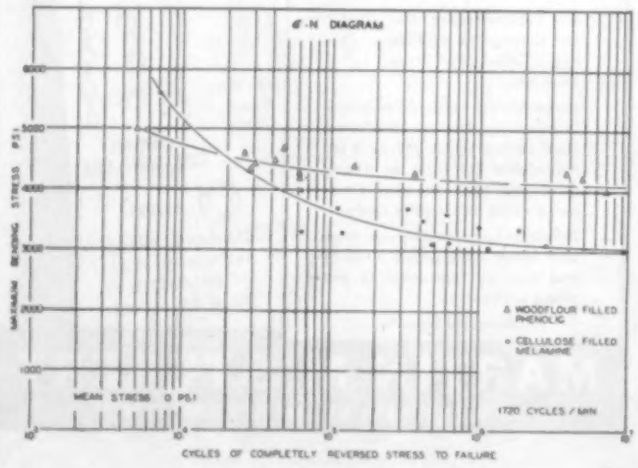
7—Long time tensile strength, cellulose filled melamine

that for the melamine material. The temperature rise for both materials during the testing was found to be practically zero.

Theoretical

The melamine and phenolic molding compounds belong to the class of plastics commonly referred to as thermosetting, that is, such materials become essentially infusible upon application of heat and pressure. This infusibility is due to cross-linking of the molecules which occurs during the molding process. The differences in the long time tensile values of the two materials can possibly be attributed to the degree of cross-linking associated with each. Melamine resins appear to be more highly cross-linked than phenolics by such qualitative tests as hardness and brittleness. This higher degree of cross-linking is believed due to the greater number of formaldehyde reactive positions on the melamine molecule and to the higher molar ratio of formaldehyde generally used in the preparation of melamine resins. The amino groups in melamine also contribute to higher Van der Waals or intermolecular attractive forces which may be responsible for the greater hardness and resistance to flow of melamine

8—σ-N diagram, 25° C., 50 percent relative humidity



plastics when compared with phenolics. These fundamental structural differences between melamine and phenol may be used to account for the differences in behavior which have been observed.

One of the most interesting differences in the materials is the superior long time tensile strength exhibited by the melamine materials. This can perhaps be explained in terms of the "viscous pocket" theory advanced by J. B. Murgatroyd[11] in connection with his work on glass and by a similar theory for phenolic resin structure credited to Thum and Jacobi.[5] This theory considers glass to be composed of three dimensional aggregates with pockets of quasi-viscous material interposed between the molecules of the aggregates. As load is applied to the material, strain is applied to the molecular configuration as well as to the pockets of this quasi-viscous material. If the load is fixed at some constant value, the quasi-viscous material which carried its portion of the load immediately following load application, undergoes stress relaxation or flow. This results in transferring the quasi-viscous portion of the load to the molecular structure. In effect then, a stress concentration is produced which serves to weaken the material.

Thum and Jacobi[5] considered the resin structure to be that of "isogel." This structure may be likened to a sponge whose frame work is formed of macromolecules, and whose pores are filled by resin particles of lower polymerization degree, "harzbrei." The macromolecular structure is considered to behave elastically, whereas the "harzbrei" exhibit viscous flow characteristics when load is applied.

It is postulated that the melamine plastic is not as susceptible to the effect of the viscous pocket phenomenon as is the phenolic material due to the higher cross-linking of the former. The structure of the melamine may be considered to contain fewer viscous pockets with the result that the material exhibits a greater long time strength. Another explanation might be that the pockets in the melamine plastic are much more viscous than those in the phenolic material.

The similar creep characteristics of the two materials at comparable stresses may possibly be accounted for in terms of the "viscous pocket" theory. The elongation of the phenolic may be thought as of primarily due to relaxation effects of a highly quasi-viscous material until such time as the load on the molecular bonds reaches the long time strength limit. The elongation of the melamine materials might be considered to be due to the stretching of the molecular aggregates, but a more precise explanation for the similarity in creep behavior of the two materials is needed. With the great amount of work now going on relative to the molecular structure of plastics, a more satisfactory explanation of creep behavior should soon be forthcoming.

As indicated earlier in the paper, the dynamic flexural fatigue strength of the melamine materials tested

[11] "Mechanism of brittle rupture in glass," by J. B. Murgatroyd, J. Soc. Glass Technology *28*, 406 (1944).

is approximately 1000 p.s.i. (25 percent) less than that of phenolics. However, when the stress value at the endurance limit is expressed as a percentage of the short time flexural strength, it is found that the two materials give values which are essentially the same, i.e., woodflour filled phenolic 35 percent and cellulose filled melamine 31 percent. What difference there is in the two materials may possibly be due to the fact that stress concentrations resulting from surface flaws and the like would be less easily relieved in the melamine plastics because of its inherently greater brittleness.

It is recognized that the fillers used have a marked effect on the mechanical properties of plastics. However, inasmuch as the same type fillers were used for the two materials, it is felt that the tests were essentially a comparison of the two base resins.

Acknowledgments

The authors wish to thank Mr. R. D. Dunlop for his assistance in the preparation of the manuscript. The help of Mr. J. H. Watt and Mr. J. L. McMillan in carrying out the tests described herein is gratefully acknowledged.

German resins

(*Continued from page 155*) material, after mixing, is transferred in drums to the mixing rolls. The feed to the rolls is by screw to a vibrating chute which delivers the material to the center of a pair of rotating rolls. A sheet is formed, builds up and travels toward both sides of the front roll on which it forms. On this roll two grooves are cut about 7 to 8 in. from the end and two wheel-type cutting knives are located in these grooves. When the molding material sheet reaches the cutting wheels, it is stripped off. Strips thus cut off fall to a traveling belt under the rolls where the material is cooled by a current of air. The belt transfers the molding material to a crusher where preliminary grinding is done. The final grinding is done in a hammer mill similar to that used for the resin.

The rolls are 45 in. wide and 18 in. in diameter. The front roll travels 15 percent faster than the back roll. The temperature of the front roll is 90° C. and of the back, 102 to 105° C. The rolls are heated only at the start of production. Thereafter, they are cooled by water which is circulated by a pump. The temperature of the cooling water is noted and the flow of fresh water so controlled as to maintain the required temperature on the rolls. The actual temperatures of the rolls are tested with a pyrometer every two hours. The output of the rolls on a normal woodflour filled material is 250 kg./hour.

When materials which do not flux easily are being made, two or three ploughs are fitted on the rolls. These are mounted on a bar fixed at one foot from the roll surface and almost directly above the gap between the rolls. The object of these ploughs is to prevent

the material from the delivery chute from traveling on to material which has already been partly processed.

The different grades of material are controlled by variations in the feed of material to the rolls. The Krahl flow test (Electro. Tech. Zeit 1931, 52, No. 14, p. 439) is used as a final test for different grades.

The Raschig continuous process is also being tried at Troisdorf. The arrangement differs in slight details from the original Raschig process. On the back roll there is a raised portion in the form of a right and left hand screw. This is intended to assist the flow of the material to the sides of the rolls. The cutting off wheels do not operate in grooves on the rolls and are underneath the front roll, not right at the front of the roll as in the Raschig installation. The rolls are 1000 by 400 mm. in size. The front roll runs at 20 r.p.m. and at temperature of from 60 to 70° C.; the back roll runs at 12 r.p.m. and 40 to 50° C. The rolls are heated intermittently by steam injected into the water normally used in the rolls. Installation is shown in Fig. 3 (page 155). The output at Troisdorf was 80 tons per month (600 hr.). The continuous rolling process was said to work very well with soft material but sticking on the rolls was encountered with some compounds.

Kneading and rolling method[1]—Bisterfeld and Stolting had their compounding equipment well arranged to minimize as far as possible the amount of labor required. The crushed resin, filler, fixed alkali, lubricant and color are mixed in a kneading machine. The mixed material is discharged by gravity into a Kolloplex grinder, fitted with three sets of fixed pins and two sets of revolving pins. The material is fed into the center and forced out through the pins. The operating speed is 10,000 r.p.m. and the machine is used without screens. The discharge is picked up by a bucket conveyor and taken to a blender on the next floor. From the blender the material passes by gravity feed to a screw conveyor which takes it to the first of two sets of steam-heated mixing rolls, 450 mm. in diameter by 1200 mm. long.

The method of operating the two sets of rolls is to maintain a sheet continuously on the first set and to cut off portions as required. These are transferred by hand to the second set of rolls where the final rolling to the desired flow is done. The flow is controlled by the Krahl test. By using two sets of rolls in the manner described it is claimed that a greater output is obtained than would be possible if the two sets were used as individual units, since by retaining a sheet on the first set the fluxing time is greatly reduced. The molding material sheet, removed from the second set of rolls, is cooled and then crushed in a toothed spiral crusher in which small teeth are arranged in spiral fashion on a rotating horizontal shaft. These teeth engage with fixed comb plates.

From the crusher the material is taken by bucket conveyor to a mill where it is ground to 3 to 6 mm. particles and discharged to drums. The output of the two sets of rolls making the normal woodflour filled molding materials is 6 tons per 8 hours. An improve-

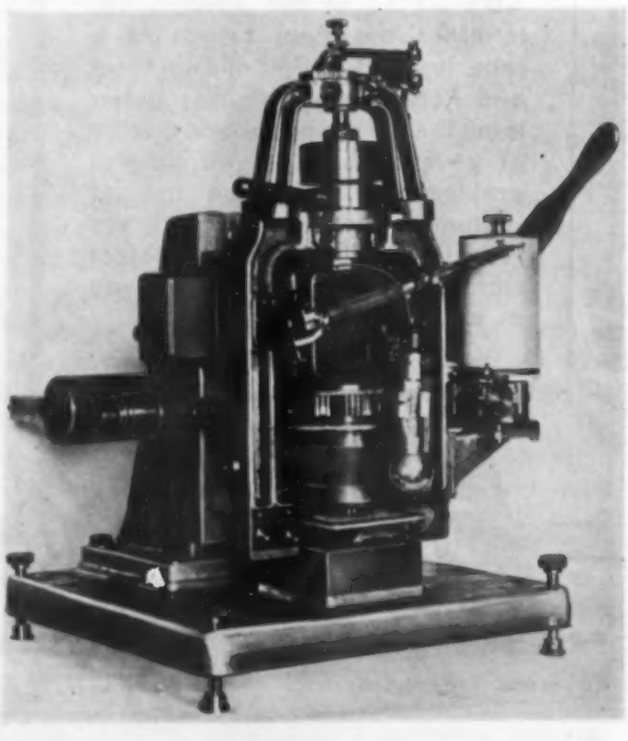
ment that is contemplated is the placing of the two sets of rolls one on top of the other so that the sheet can be transferred by gravity.

Eirich mixer[7]—A new method, which is reported to be superior to the kneading and rolling method because it is much more economical in labor, was used by the Chemische Werke Albert, Wiesbaden-Biebrich, for preparing molding compounds. In this method the mixing is done in an Eirich mixer. This is an edge runner in which the mixing wheels are arranged in pairs and rotate in one direction, while the pan rotates in the other. Discharge is through an opening in the bottom. The standard Eirich mixer can be heated by steam or hot water circulating in a jacket. However, when the molding material is heated in this manner, it cures and sticks to the pan. Heating is now done by injecting high pressure steam.

The method of operation is to charge the mixer with the ground resin, hexa, filler and other ingredients and 13 percent of water (calculated on the molding material composition as a whole). The mixer is closed and high pressure steam at 300° C. is passed in for 1 to 2 minutes. The moisture content of the composition increases to 19 to 20 percent, and the temperature rises to 70 to 85° C. (recorded by a thermometer in molding material). When the temperature reaches 70° C., the steam is shut off and mixing is continued for 30 to 50 minutes. The material is then discharged and dried in a rotating tunnel drier. This drier is 8 meters long and 1.2 meters in diameter. It rotates at 30 to 60 r.p.m. Hot air is blown through, the temperature

[7] "Investigation of German plastics plants. Part 2," by J. H. Rooney, G. M. Kline, J. W. C. Crawford, T. W. M. Pond, T. Love and R. H. Richardson, PB 25642.

5—Schmidt-Bisterfeld cure testing machine



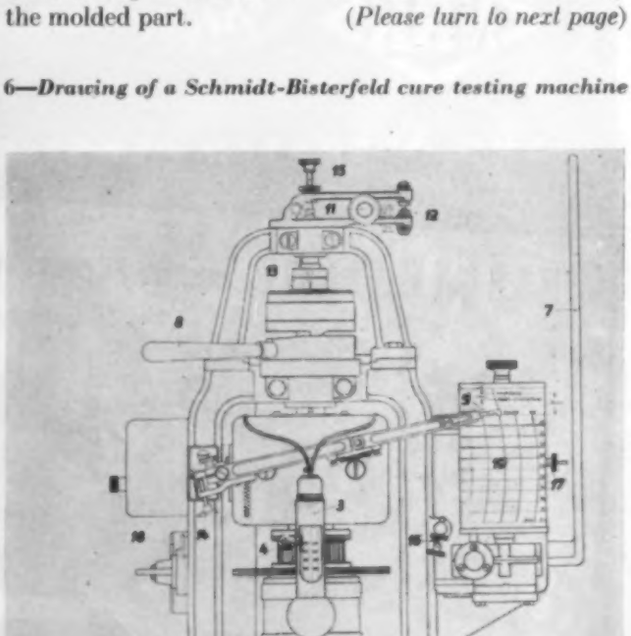
being 95 to 110° C. near air inlet, falling to 45 to 50° C. at the far end. The final material contains 5.5 per cent moisture and is claimed to be sufficiently granular to give no trouble on automatic pelleting machines.

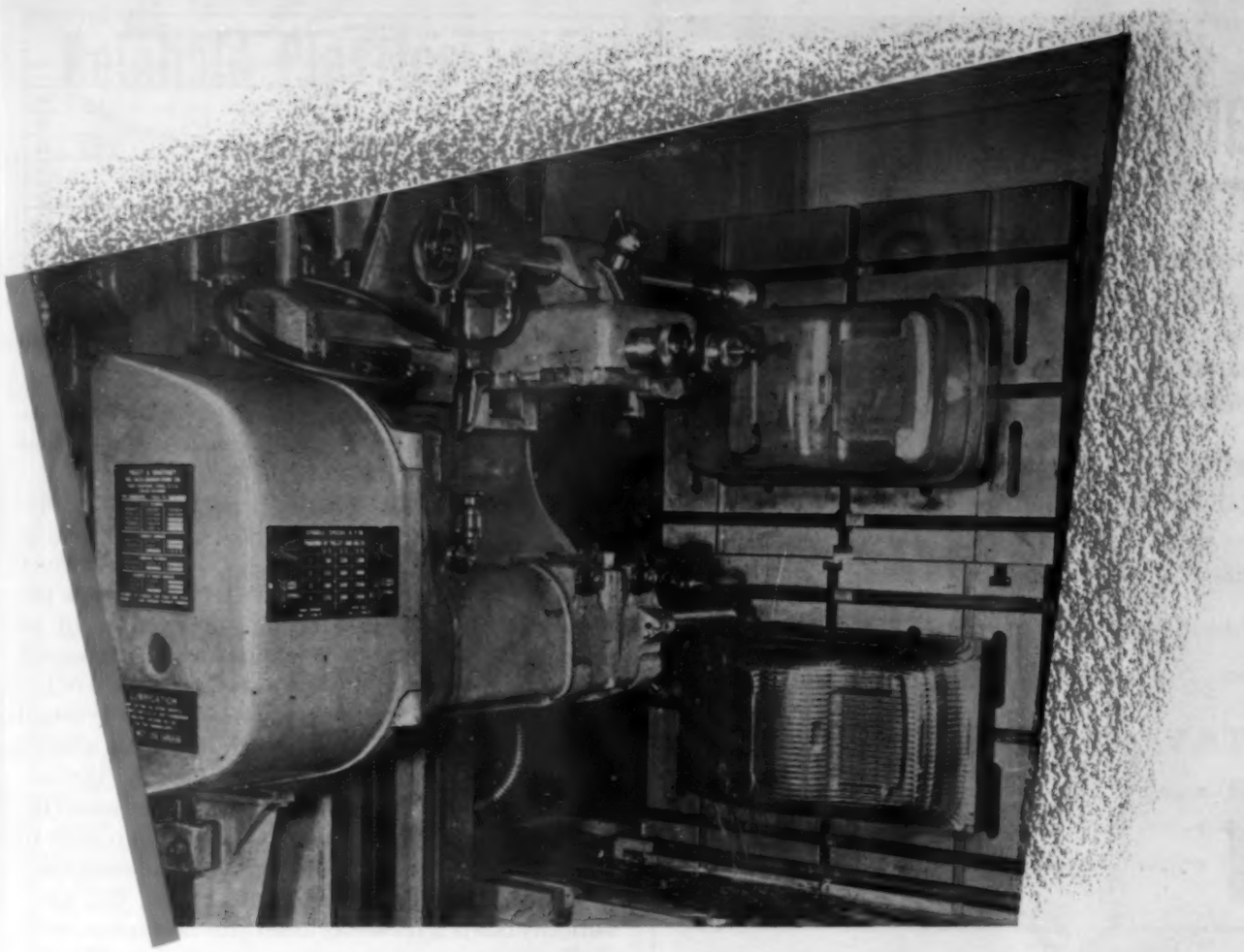
The batch charge to the mixer is 500 to 800 kg. and the output of the finished molding material is 500 kg./hour. The capacity of the drier is 1.5 to 2 tons/hr. and of the Eirich mixer 1 ton/hr., so one drier can almost deal with the production of two mixers. To make 100 kg. of molding material by this process requires 1.8 man-hours. It is thought this can be cut to 0.6 to 0.8 man-hours if material is conveyed mechanically.

Schmidt-Bisterfeld cure test[7]

Apparatus (Fig. 5) has been developed by Bisterfeld and Stolting for controlling the molding of phenolic materials. The principle of the machine is the measurement and plotting of time versus amount of penetration of a heated needle into a phenolic molding. In the conventional Vicat needle test the specimen is heated in an oven to the desired temperature (usually 180° C.) and then the needle is applied to the specimen under a fixed load. In this method the condition of the test specimen as regards cure is different when tested than it was before because the material is further cured during the period of heating in the oven. The Vicat needle test therefore cannot be used to give any idea of the initial condition of cure of a molding. This defect is avoided in the Schmidt-Bisterfeld apparatus by using a heated needle which penetrates the specimen, the latter being at room temperature. Furthermore the time of test is only 2 to 3 min. whereas the Vicat method requires 2 hours. The test does not destroy the molded part. (*Please turn to next page*)

6—Drawing of a Schmidt-Bisterfeld cure testing machine





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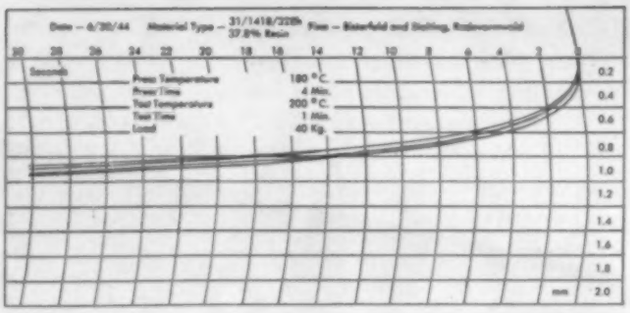

7—Plot of penetration versus time made by a Schmidt-Bisterfeld machine. The specimens are molded at 180° C. for 4 minutes. Penetration in one minute was determined with the needle at 200° C. under a 4-kg. load

The operation of the machine[8] is as follows (Fig. 6): the 30° cone-shaped steel needle (19), held by a locking screw (5), is heated by a coil (4). The temperature of the needle is maintained at some temperature in the range 200 to 280° C., depending on sample to be tested, by a thermostat consisting of a right-angled mercury thermometer (3) with a steel needle above the thread controllable by an external magnet. The actual temperature of the needle is determined with a millivolt meter. The needle is brought to rest on the surface of the sample (6) by means of a counterpoise (18) and is locked in this position. A weight equivalent to 40 kg. is put on by a ratchet (8) which at the same time, by means of an electrical contact (11 and 12), automatically starts a revolving drum (10) bearing an inked needle (9) on a specially prepared graph sheet (Fig. 7).

The drum completes a turn in a predetermined time of 30 sec. or 1 minute. The rate and depth of penetration of the needle into sample is shown on the graph (Fig. 7), the maximum 2 millimeter penetration being magnified to 4 inches. The apparatus is set on an aluminum casting, the level of which is adjusted by screws (1) and bubble (2). The apparatus naturally must not be used near an open window where drafts could alter the needle temperature from that chosen.

The penetration test is performed on a specimen, usually a small disk, which is molded under strictly controlled conditions of temperature and time. The conditions which give the best combination of properties, tensile strength, water resistance, appearance, etc., are determined for the particular type of material under consideration. The test piece, molded as required, is cooled and placed in the apparatus and the penetration is measured. This is recorded graphically as a plot of penetration against time. The temperature of the needle is usually 200° C., but this as well as the time can be varied as required.

It has been found that an indentation of 1.2 to 1.4 mm. in 60 sec. is indicative of the proper cure for most phenolic resins. It is claimed that the test has made it possible to determine quickly the proper curing conditions for each batch of molding powder and hence to reduce greatly the number of rejects.

[8] Complete working drawings of the machine are given in the reference cited in footnote 1.

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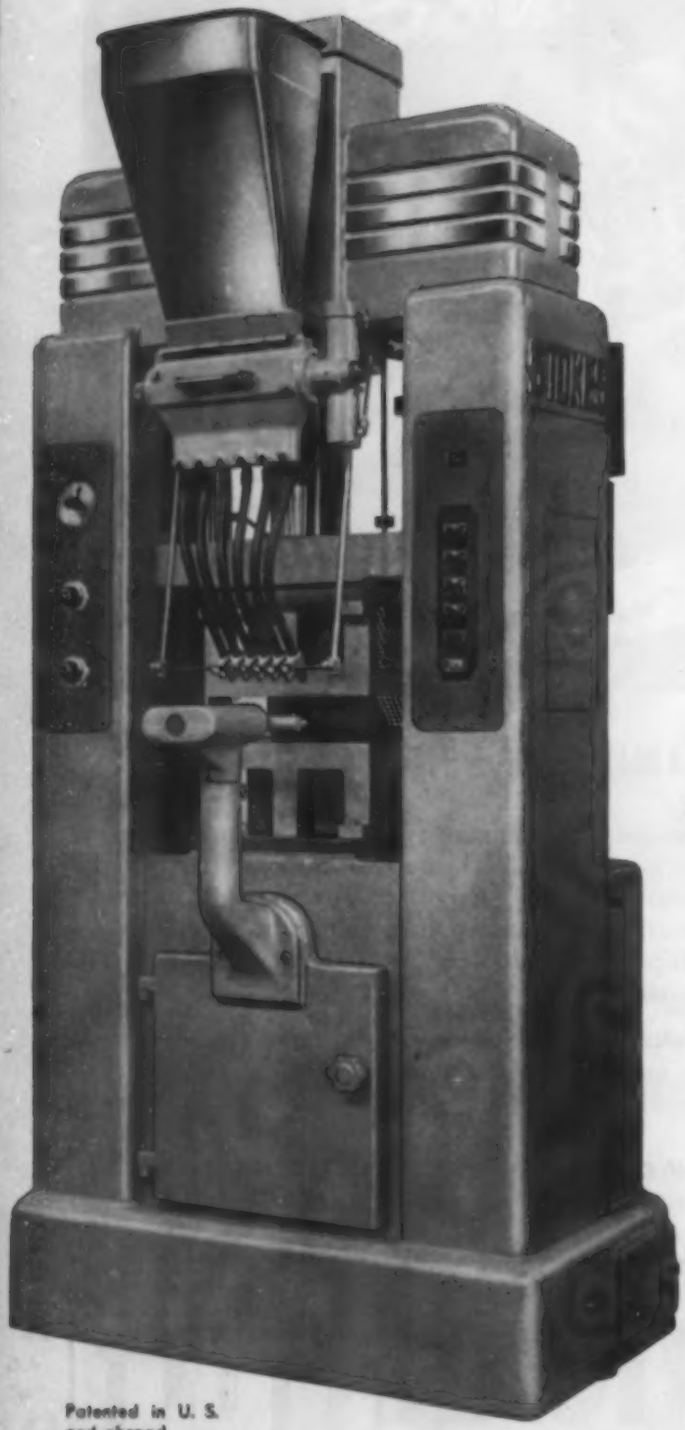

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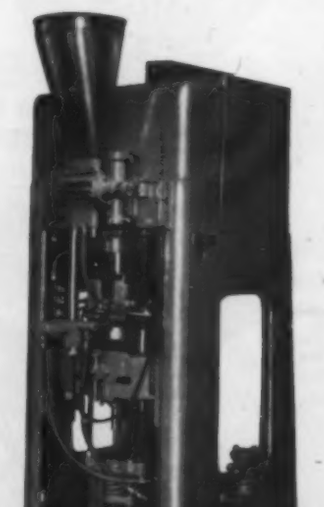

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THIS 28″ × 28″ card table is an example of the unusual size of molding job that we are in a position to handle. This top is molded from phenolic molding compound and has reinforcing ribs on underside.

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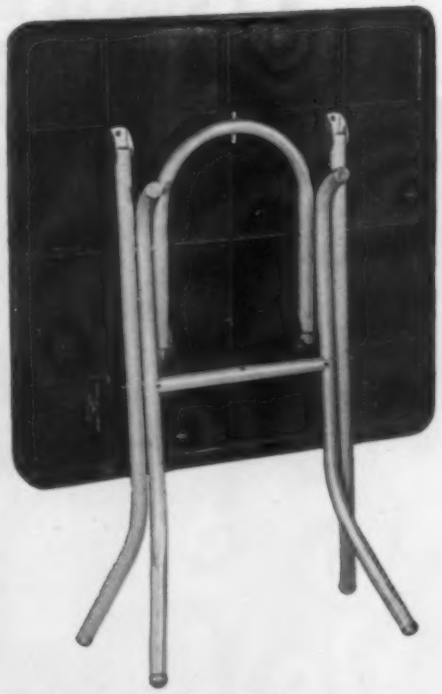
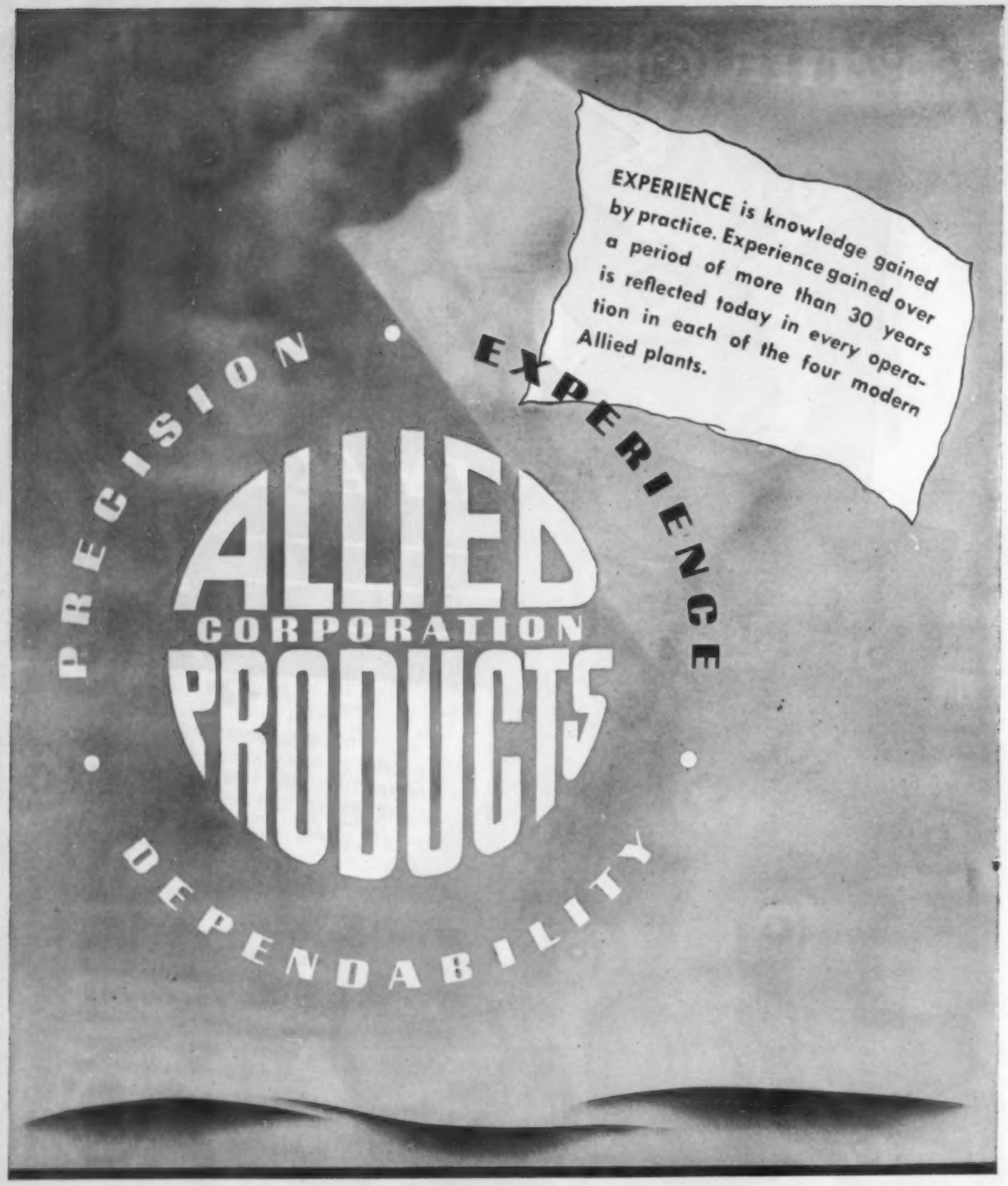


Reverse side of table top. Brass inserts for attaching legs are molded in the part. No fabrication or trimmings are necessary.



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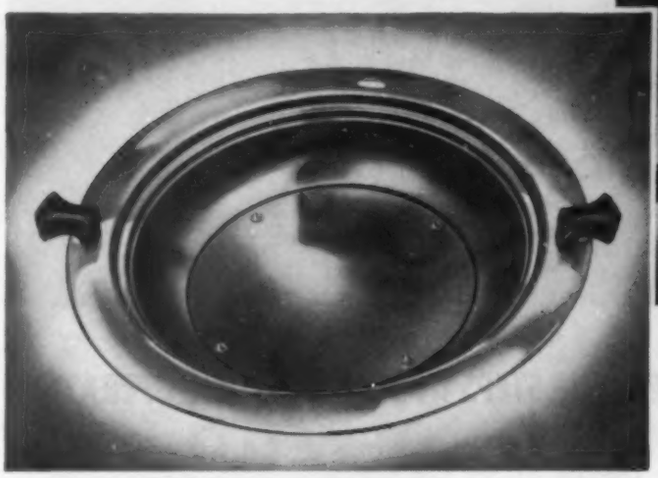

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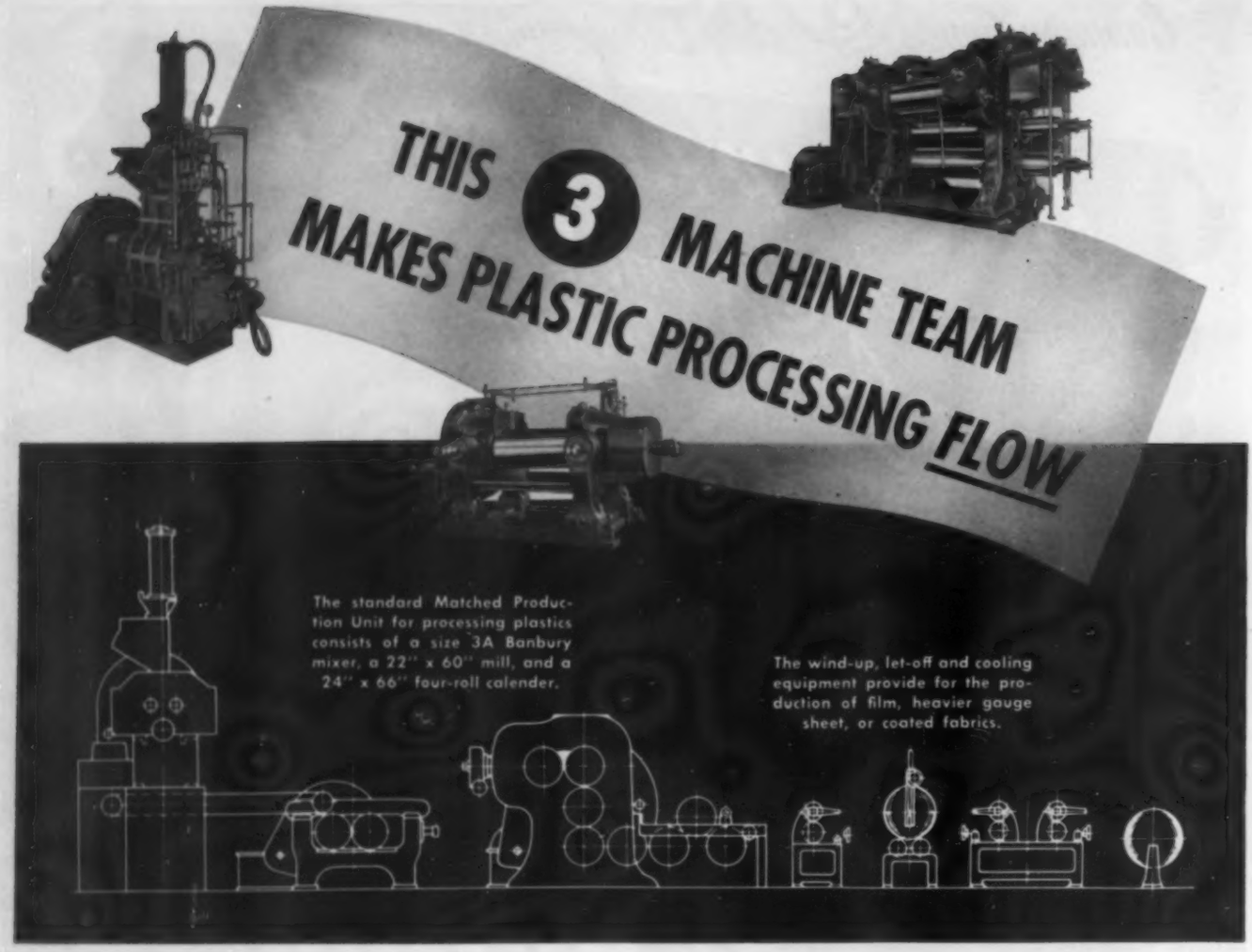

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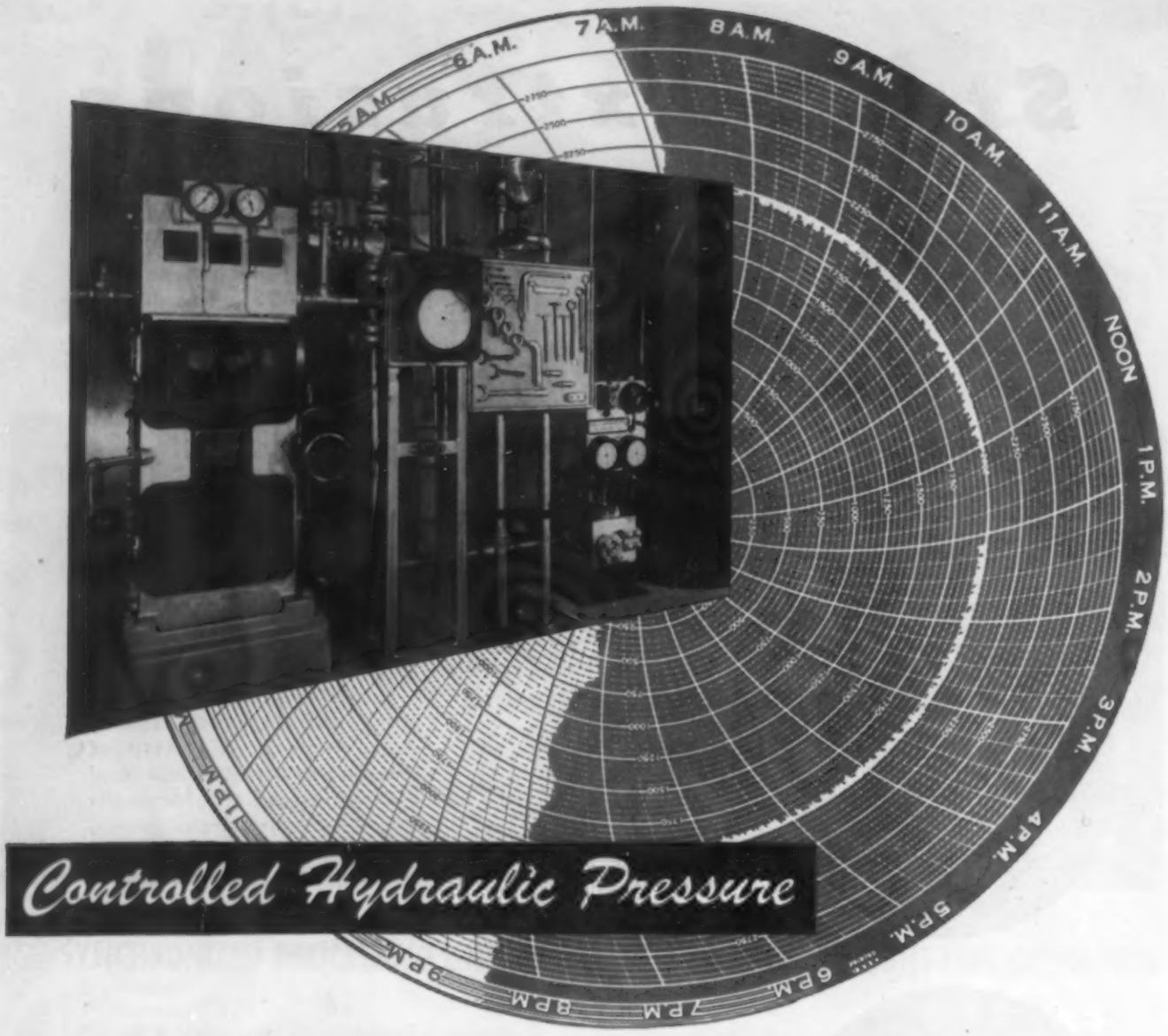

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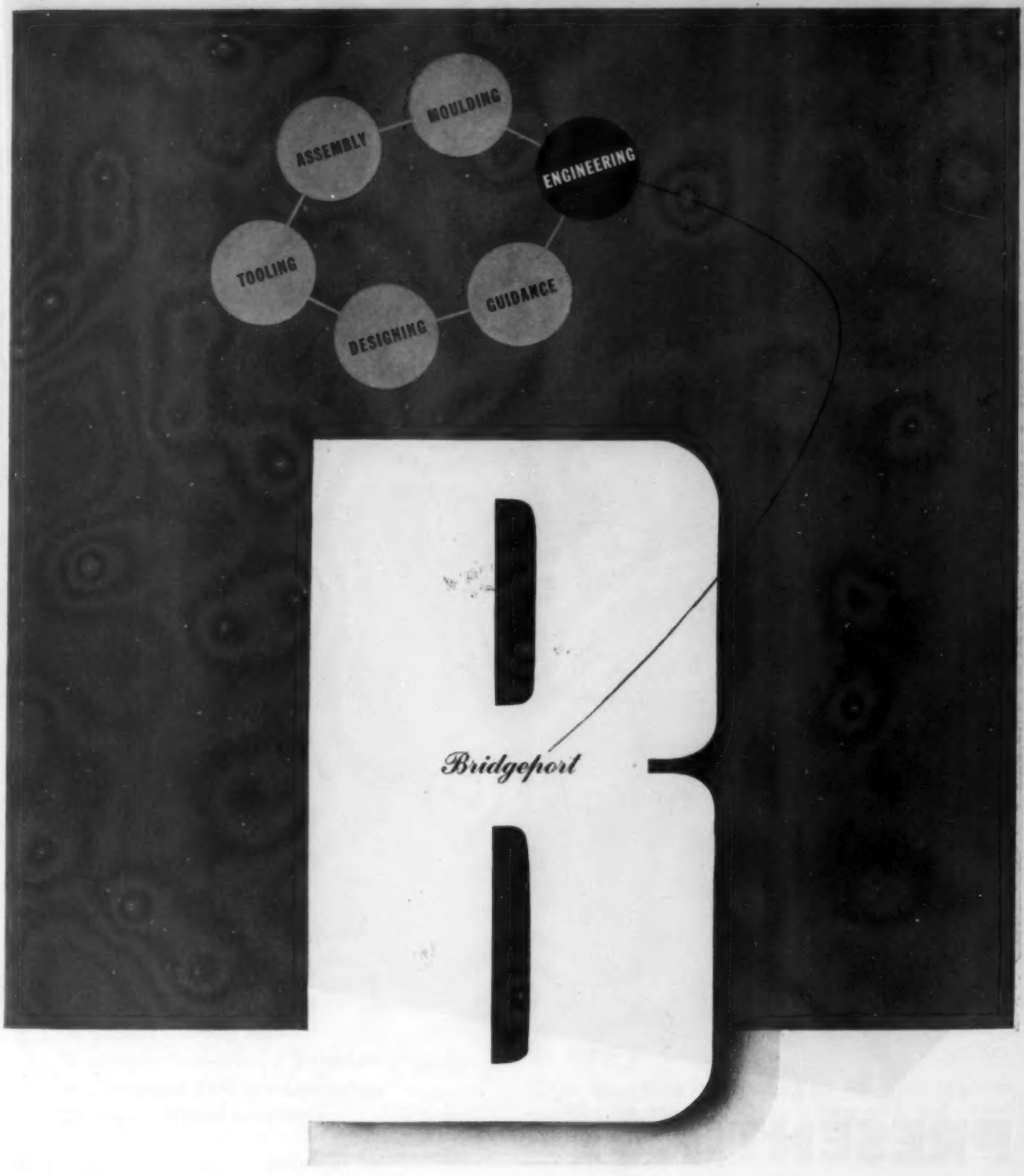

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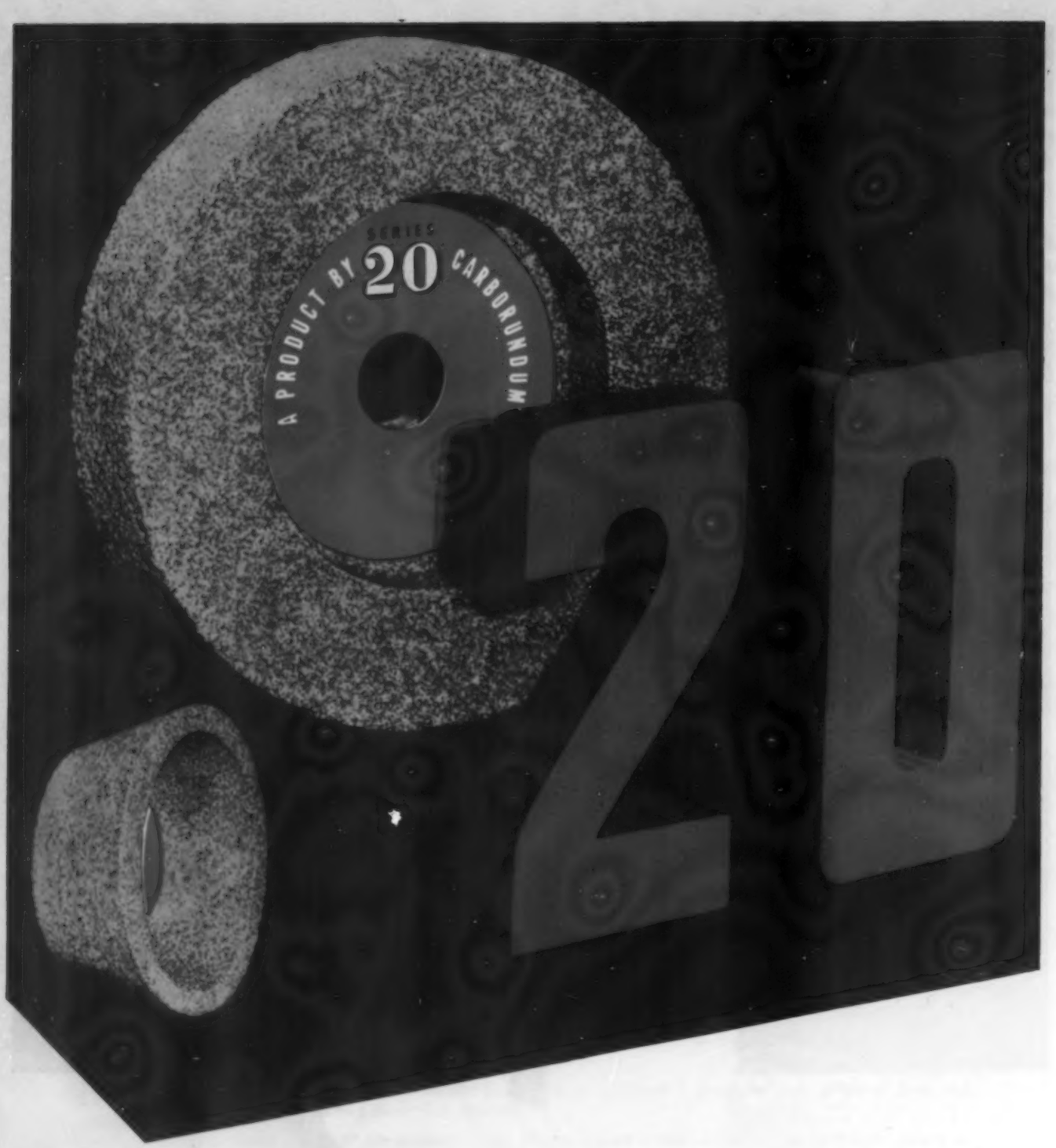

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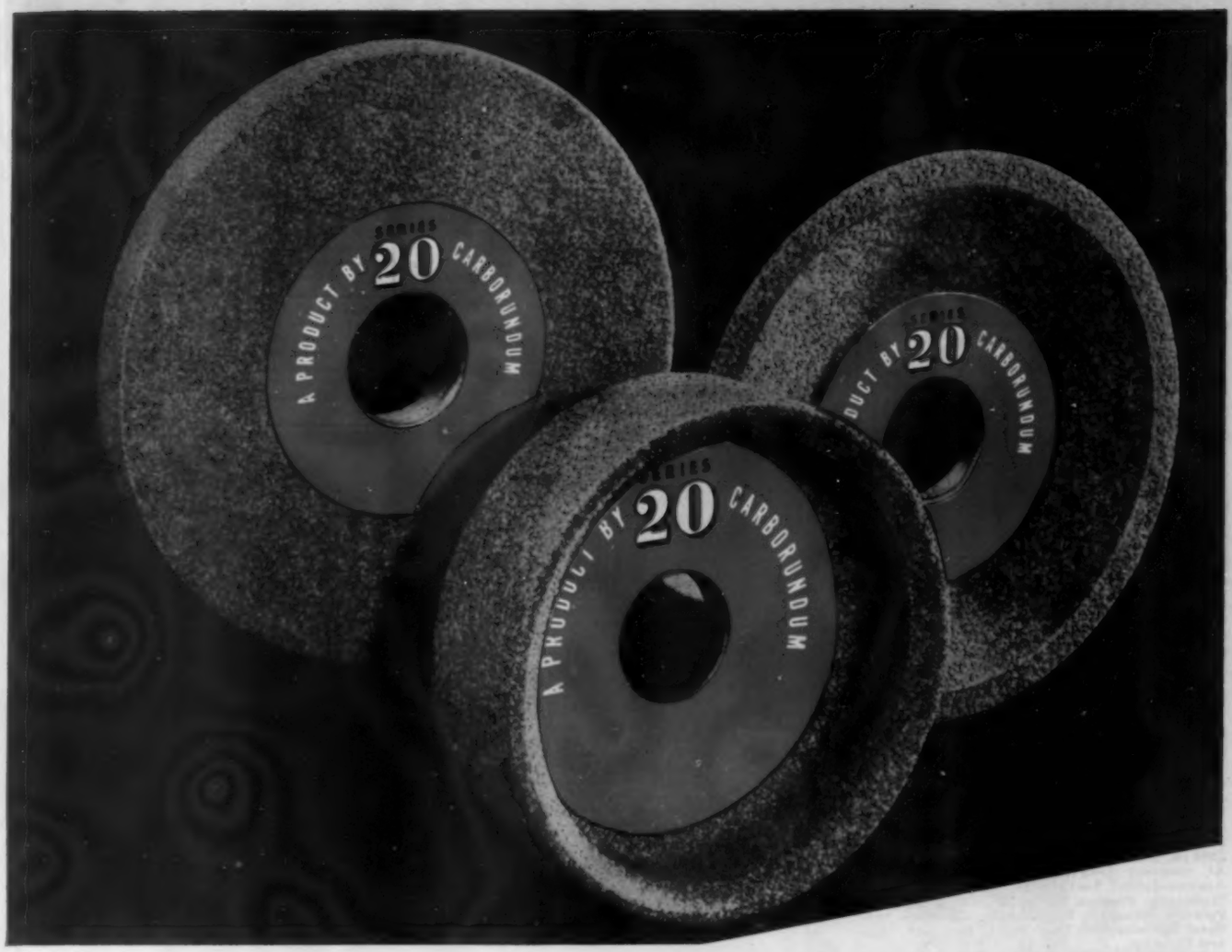

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PROCESS ENGINEER—Established concern in Greater Boston is starting new division which requires engineer experienced in plastics molding and materials. Give resume of education and experience. Reply Box C323, Modern Plastics.

RUBBER EQUIPMENT FOR SALE: BIRMINGHAM CALENDER—3 rolls 16" x 30", Best chilled iron, ground and polished faces and journals, hand wheel adjustments, flexible hose for steam connections, bronze bushings. American Marsh Steam Pump—Size: 20" x 2½" x 12". 3000 lbs. P.S.I. with 100 lbs. steam. Hymac Open Steam Vulcanizers (two) Inside measurements 4'6" dia., 12' long; 4' dia., 13' long. Used for 100 lbs. steam working pressure. Self locking swing doors. Accumulator—3" Ram, 3-foot stroke, 7' high guides, 8 Platens, each 39" x 39" x 4" thick. Total weight 1800 lbs. All above equipment is in excellent condition. For further information, write to: City Steel & Machine Co., 8801 Conant Ave., Detroit 11, Mich.

FOR SALE

1 Lupomatic #2 Tumbler Type F. 30 × 36 units with a 1 HP Motor. Brand New—Never Used—Immediate Delivery.

THE MONOGRAM COMPANY
Long Branch, New Jersey

Experienced man wanted with complete knowledge of injection molding machines, both Reed Prentice and Lester Phoenix, for supervision of well-known plant in the vicinity of New York City. State age, experience, references, and salary desired. All answers will be held in the strictest confidence. Reply Box C324, Modern Plastics.

Sales Executive wanted, thorough knowledge plastic molding materials and plastics industry generally. Knowledge languages preferred. Write full details technical training, experience, approximate salary. Confidential. Reply Box C325 Modern Plastics.

ATTENTION PLASTIC FABRICATORS: New Behr-Manning and Minnesota Mining wet sanding belts for sale. 800—4" x 82", 150 grit, price $97.00 per 100; 150—4" x 106", 320 grit, price $98.00 per 100. Discount for any quantity 30% from above prices. Freight allowed on 100 pound shipments anywhere in the United States. Precision Specialties, Inc., 210 North Western Avenue, Los Angeles 4, California.

WANTED—150 and 200 Ton Self Contained Stokes Standard Compression Presses. Send details to Box C326, Modern Plastics.

FOR SALE: Dielectric Heater, 200 Volts—2 K.V.A. Built on premises. Used short time only for experimental work in plastics. Tubes guaranteed for 1000 hours. Must sell at once. Will sell very reasonably. Bargain for party who can use it. Reply Box C333, Modern Plastics.

SALES ENGINEER available. Custom molding. New York area. Reply Box C335, Modern Plastics.

FOR SALE: Three hydraulic presses, 12 x 12, 14 x 14, 26 x 26 inch platens. Very good for laboratory or commercial runs. Equipped with electrically heated platens. Pressure furnished Grayco high pressure pumps. Two presses equipped with low pressure units for quick closing. One way jacks with air cylinders for opening. Three presses including air compressor and tank $3500.00. Write Box 1663, Fargo, N. Dak.

FOR SALE

H.P.M. 9 oz. injection molding machine, brand new, never used, in original cosmoline, with 7" bolster plate. Cost $13,350; will sell for $12,500. Machine now on floor in Brooklyn and can be inspected. See or write, Prest Button Corp., 254 Navy St., Brooklyn, New York.

DEVJIBHAI K. HINDOCHA LIMITED., reputed Cotton Merchants, Ginners and Millers of P.O. Box 244, *JINJA*, Uganda (B. E. Africa), will welcome opportunities to represent Overseas Manufacturers of goods throughout East African Territories. Manufacturers will please communicate with them at their above address.

WANTED

Self-contained, new or used, semi-automatic 100, 150 or 200 ton hydraulic compression molding press with automatic time cycle control.

Write to R. E. C. Manufacturing Corp., Holliston, Massachusetts.

For Sale: Taber Thermofold 180 degree folding machine for sheet stock. Practically unused, in excellent condition. Reply Box C328, Modern Plastics.

EXTRUSION SALESMAN, now employed, seeks strong, technically competent firm, to which he can bring business. Full time, permanent, experienced representation offered in the New York area. Reply Box C329, Modern Plastics.

WANTED

8—12—16 oz. injection molding machines. Must be in perfect condition.

Reply Box C330, Modern Plastics.

CHEMISTS
CHEMICAL ENGINEERS

Progressive and growing chemical manufacturing company on the eastern seaboard has openings for chemists or chemical engineers trained and interested in product and process development in resins and plastics. The positions offer excellent opportunities for research and advancement with a well-established and reputable firm. Write giving age, experience, education in first letter. Applications will be acknowledged promptly and treated in confidence. Reply Box C331, Modern Plastics.

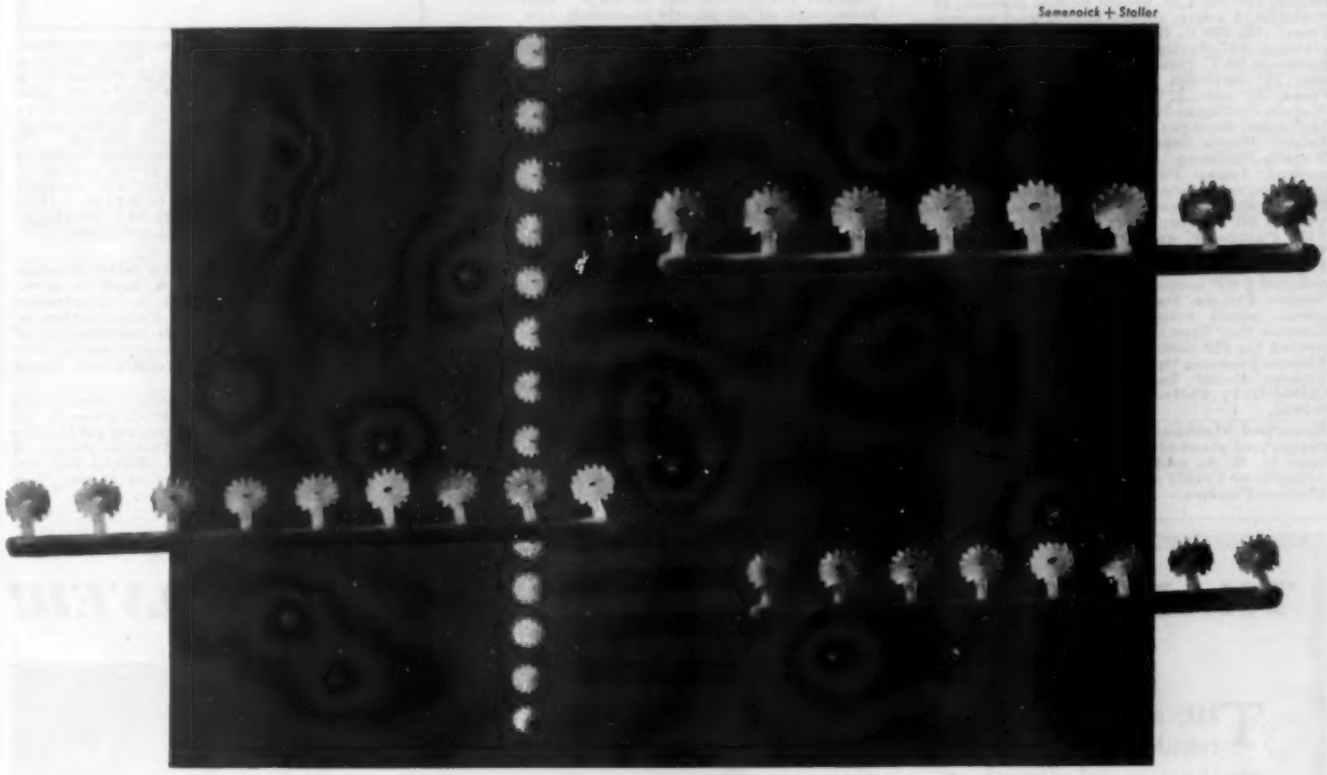
FOR SALE: Hydraulic Presses 36" x 36" 16" ram, 200 tons; 26" x 52" 14" ram, 385 tons; 12" x 12" 7½" rams 50 tons; 3—15" x 15" 8" rams 75 tons; 19" x 24" 10" rams, 78 tons; 13" x 19" 12" rams, 100 tons; 20" x 20" 14" ram, 192 tons; 23" x 17½" 8" rams; 75 tons with pullbacks; 17" x 16" 8" ram, 75 tons; 22" x 15" 8" ram, 75 tons; 12" x 13" 6½" rams, 50 tons; 8" x 9½" 4½" rams, 20 tons; 50" x 32" 24" ram, 700 tons; 21" x 24" 20" ram 500 tons; Pumps: HPM Triplex 1½ GPM 2500#, Robertson duplex 1½ GPM 4000#; Worthington Triplex 12 GPM 2500#; Gould Triplex 12 GPM 1250#; Worthington 2½ GPM 4000#; 4 plunger 6 GPM 2000#; Watson Stillman duplex 1 GPM 2500#, Extruders #3 Royle Perfected. Allen 6"; Mixers: W&P 100 gal. jacketed Sigma Blades; W&P 100 Gal unjacketed; Mills, Calenders, Laboratory Presses, Accumulators, Hydro-Pneumatic and weighted types, etc. HIGHEST PRICES PAID FOR YOUR USED EQUIPMENT. Universal Hydraulic Machinery Company, 285 Hudson Street, New York City 13.

WANTED SALES ENGINEER
INJECTION MOLDED PLASTICS

For Chicago and vicinity by established Chicago molder. Preferably with experience selling custom molded plastics and/or close contacts with purchasing agents. Top commission plus the kind of delivery, quality and service support that will enable you to make real money. Box C332, Modern Plastics.

GEARS: *Precision molded*

Semenoick + Stoller



Silent and tough, NYLON gears give better performance and save thousands of dollars in certain applications requiring large quantities. When the Aerequipt Corporation of Mt. Vernon, N. Y. changed from Brass to Nylon for the Spur gears shown above, they gave the production problem to Atlantic of New York which molded them within maximum tolerances of .002". This is a typical example of Atlantic's skill in precision molding.

ATLANTIC
OF NEW YORK

ATLANTIC PLASTICS, INC.

132-25 FORTIETH ROAD, FLUSHING, N. Y. • "Here dwells ingenuity"

Want Plastic Plant Superintendent of exceptional ability to manage compression molding plant of approximately 200 employes. Must know Thermosetting material compounding, Electronic operations; equipment such as accumulators, presses, mills, hydraulics; steam, air, water lines, etc. Must be able to build organization in plant, have ability to get things done, and excel in production. Nothing to do with sales. Excellent future for right man in fast growing organization in Middle-West. Give full particulars, past experience in this line of work, and where employed at present. State salary expected. All information confidential. Our own organization has been advised of this ad. Reply Box C334, Modern Plastics.

HYDRAULIC PRESSES & PUMPS—(2) Shriver Hydraulic Laminating Presses, 12" ram, 12" stroke, 12—15" x 15" steam heated platens, 48" daylight, 4 posts, steam heater and connections. (2) 100 T. Hydraulic Presses, 15" x 15" platens, 24" daylight, 12" stroke. Watson-Stillman 50 T. Press, 7½" ram, 12" x 13" platens, 12" daylight. Watson-Stillman 50 T. Press, 7½" ram, 12" x 12" platens, 18" daylight. Watson-Stillman 50 T. Press, 12" x 14" platens, 7½" ram, daylight adj. 15" to 23". (2) West Triplex Pump complete with 7½ HP motr. Watson-Stillman Horizontal two plunger pump. Logan Power Unit, 17 gpm., 200# pressure, complete with 5 HP motor. Logan Power Unit, 1.5 gpm., 500# pressure, complete with ¾ HP motor. Unit of two Vickers Type V134 Pumps, 17 gpm., direct coupled 20 HP Westinghouse double end motor. Vickers Type 105 Pump, 11 gpm., 1000# pressure, direct coupled 2 HP motor. (3) Vickers Type VC108 Double Pumps, large volume operation 12.6 gpm., small volume operation 1.8 gpm. Gerotor May Type H100F.25 Pump, direct connected 1½ HP motor. Barnes Pump, Type 20. Vickers Pressure Operated Four Way Valves & Vickers Relief Valves. LUNNEY CARSON COMPANY, Philadelphia 32, Pa. BAldwin 9-5932.

Executive Mechanical Engineer, Plastic Die design and plant management. Broad experience U. S. A. and abroad. Desires change Atlantic or Pacific seaboard. Reply Box C237, Modern Plastics.

DESIGNING MECHANICAL ENGINEER

Splendid opportunity in our Research Department for a graduate mechanical engineer who has creative ability to design special machinery for new products and improvements in present machines. Permanent position, work interesting and congenial surroundings. Company substantial and growing. Knowledge of paper, plastic laminates or coatings advantageous. Location Western New York. Write us your qualifications and salary expected. If application meets our requirements, interview at plant will be arranged. Correspondence treated confidential. Reply Box C336, Modern Plastics.

PLASTIC ENGINEER AVAILABLE—Mechanical and Plastic Engineering background, tools, dies and moulds. Thorough knowledge of all plastic materials and their application. Specialized in injection, extrusion moulding; plant setup and management. Member of the Society of Plastic Engineers. Reply Box C337, Modern Plastics.

SALES ENGINEER—PLASTIC PLANT

To solicit custom molding for well established manufacturer. Engineering degree or equivalent preferred. Experience with plastic molding desirable but not essential. Experience selling industrial accounts important. Chicago plant. Liberal commission arrangement. Permanent affiliation desired. Territories now open: Chicago area, Detroit, Cleveland, Pittsburgh, New York, St. Louis, Kansas City, Indianapolis, Texas, Denver, Seattle, San Francisco, Atlanta. Reply Box C338, Modern Plastics.

FOR SALE: Complete Plastic Molding Plant consisting 12 Hydraulic Molding Presses and Accessory Equipment. Several 3½ Greenerd & Famco Arbor Presses. Several 75 to 120 ton Hydraulic Molding Presses—12" x 12" to 16" x 16". One 25" x 6½" x 48" Watson-Stillman Hydro-Pneumatic Accumulator. Plastic Machinery Exchange, 426 Essex Avenue, Boonton, New Jersey. Telephone, Boonton 8-1615.

SALESMEN WANTED to represent established manufacturer of Plastics specializing in laminations and displays. Prefer men now calling on national advertisers and agencies. Commission arrangement. Reply Box C-339, Modern Plastics.

Compression Press Wanted—150 or 200 ton semi-automatic compression press. Stokes Toggle type preferred. Ram type satisfactory if equipped with pull backs and built-in ejector system. Reply Box C340, Modern Plastics.

WANTED

STOKES TOGGLE PRESSES

150 Ton 200 Ton 300 Ton

Machines for own use—we are not dealers. Reply Box C341, Modern Plastics.

FOR SALE: 1—Baker Perkins jacketed Mixer 100 gals. working capacity; HPM 500 ton Mold. Presses 42" x 48"; D.& B. 500 ton 42" x 48"; Adamson 400 ton 27" x 24"; 20" x 20"; also 20 to 250 tons from 36" to 36" to 12" x 12"; Farrel 16" x 48", 2 Roll Rubber Mill; Stokes rotary Preform Tablet Machines 1⁵/₁₆", 7/16", & 3/16"; 40 ton Broaching Press; Injection Molding Machines: W. S. Hor. 4 Plgr. 1" x 2" x 4" H. & L. Pressure Pumps; HPM 1¼" x 6" vertical Triplex 10 GPM 2700 lbs. PARTIAL LISTING, WE BUY YOUR USED MACHINERY. STEIN EQUIPMENTCO., 426 BROOME ST., NEW YORK 13, N. Y.

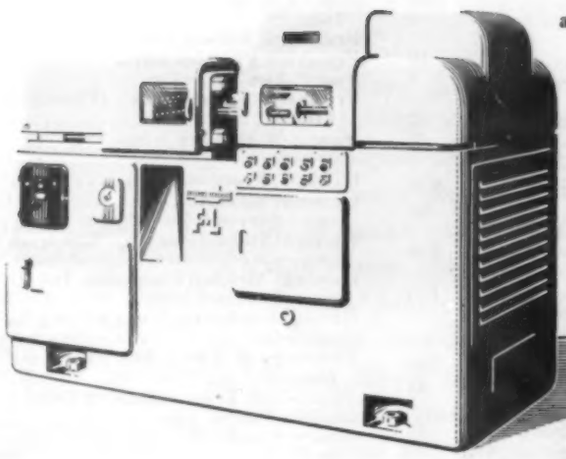
OPPORTUNITY—Young man with Plastics Background—willing to work hard in a responsible position, wanted by progressive molding concern in N.Y.C. Participation in profits offered against cash investment of $5,000-$10,000. State full particulars in first letter. Replies held strictly confidential. Reply Box C342, Modern Plastics.

FOR SALE—30—Stokes, Colton Preformed Presses, Models F, T, R, D, DD2, from ¾" to 2½"; 5—Baker Perkins, Readco, 100 gal Double Arm Jacketed Mixers; 1—Vickers Pump 20 GPM, 1000 lbs., motor driven. BRILL EQUIPMENT COMPANY, 225 West 34 Street, New York 1, N. Y.

A STAR IS BORN

...the 2-oz. you've waited for!

Actually the industry wrote the "want list" of machine features which Fellows-Leominster engineers have raised to high efficiency in this completely new, ultra-modern 2-ounce Injection Molding Machine. » » You've said: "Why can't there be heating that takes less than 3 K. W." "Give us a small, fast machine operating at more than 5 shots per minute." "We need a fast, small machine for experimental runs." "Streamline the motor and controls into the machine." "Make a simple die-plate adjustment so our die alignment will be easy." "Let's have 20 lbs. per hour plasticizing capacity, and a big casting area." "We need variable injection pressures." » » We answer: Here it is! New born from the development and testing floor, combining all the perfections in design and operation, in fact, all you could ask for in a rugged, fully-automatic machine. For more details write: The Fellows Gear Shaper Company, Head Office and Export Dept., Springfield, Vermont. Branch Offices... 616 Fisher Building, Detroit 2... 640 West Town Office Building, Chicago 12. New England Distributor: Leominster Tool Company, Leominster, Mass.



Fellows

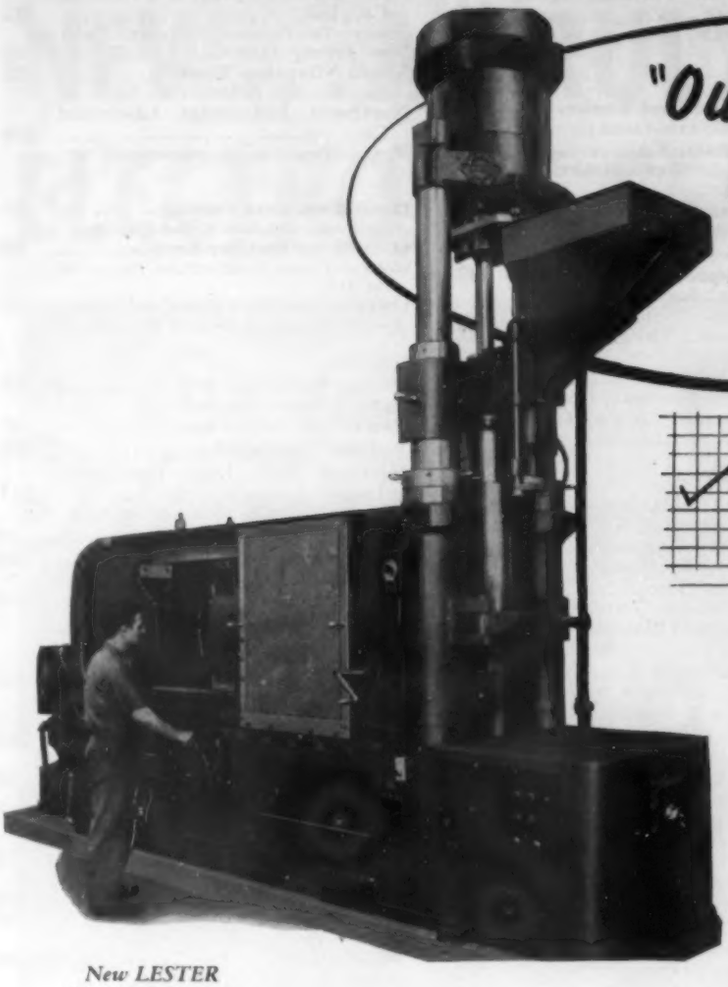
injection molding equipment

First Shown at the National Plastics Exposition... Chicago, May 6-10, Booths 28-30

MODERN PLASTICS ADVERTISERS

MAY 1947

(Please turn to page 278)



New LESTER
L—3½—32 ounce

"Our LESTERS made an honest man out of me"

A SALES MANAGER REPORTS

● "'When will you ship?' That's the question I get from plastic buyers all day, every day. And until we got our *new* LESTER molding machines, our customers claimed that I never told the truth. But now, when we figure our production schedule, I can make promises and know that our LESTERS will come through, right on time . . . I'm an honest man today because our LESTERS really produce."

● There are good reasons for LESTER'S "honest" performance. The LESTER injection molding machine, the *new* LESTER you will see at the S. P. I. show in Chicago, was designed during war years to give positive assurance of peacetime production. Consider these exclusive LESTER features . . . **1.** The one-piece, cast alloy steel frame with no moveable parts to get out of adjustment . . . **2.** The unique LESTER vertical injection system, open on all sides for quick, easy cleaning and adjustment . . . **3.** LESTER patented toggle mechanism with all of the die locking pressure carried on four metal columns—not on pins that wear out . . . **4.** Greater platen travel permitting use of larger, deeper molds . . . **5.** Larger die height adjusting screw with supporting area equal to die area prevents platen deflection . . . **6.** Flexibility of control of both injection speed and injection pressure is standard equipment on all models . . . **7.** The LESTER safety gate is interlocked hydraulically, electrically and mechanically.

Write Today

for information on the new line of LESTER injection molding machines...6-8-12-16-24 and 32 ounce models. The LESTER vertical die attachment is available for the smaller machines.

NEW YORK
CHICAGO
LEOMINSTER
CINCINNATI
LOS ANGELES
SAN FRANCISCO

INJECTION MOLDING MACHINES

Distributed by **LESTER-PHOENIX, INC.**
2621 CHURCH AVE., CLEVELAND 13, OHIO

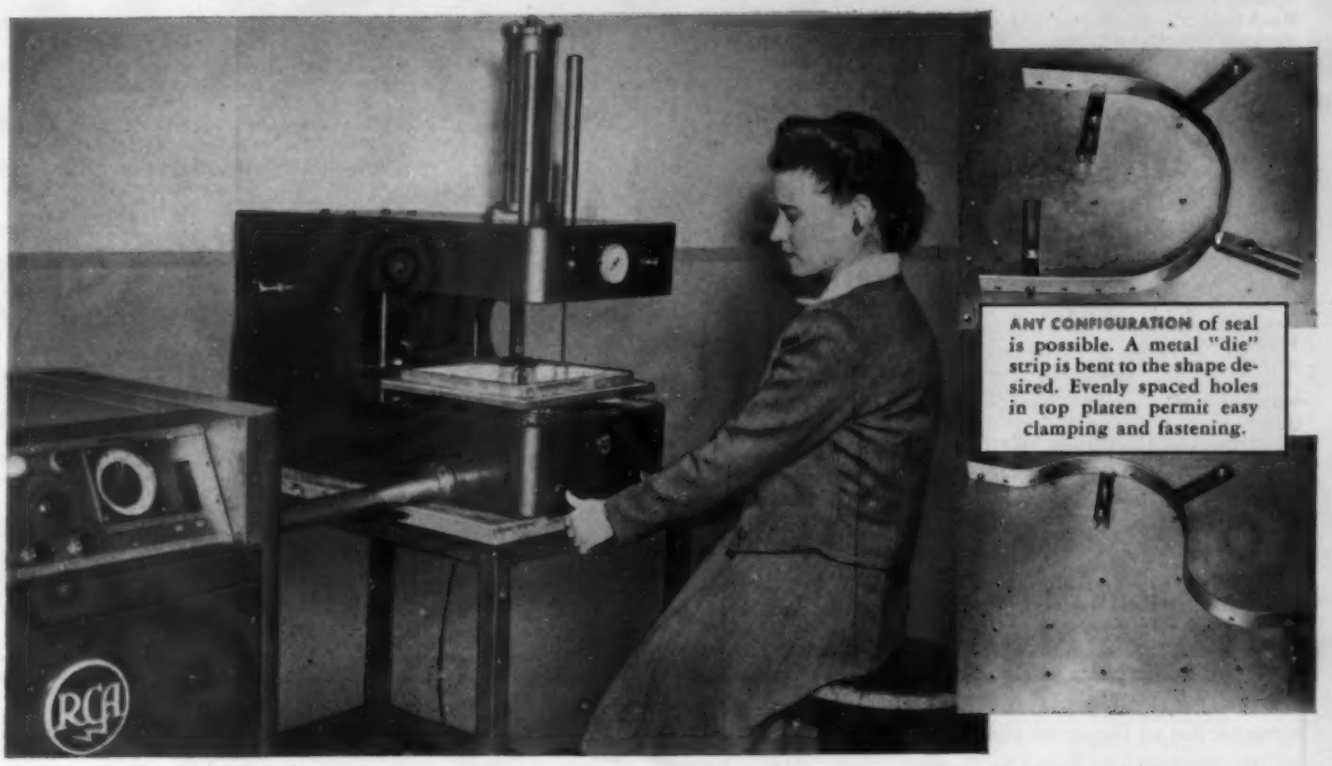
(Please turn to page 280)

A BRESKIN PUBLICATION

MODERN PLASTICS

Published by MODERN PLASTICS, INC.
122 East 42nd Street New York 17, N. Y.

NEW...A TRULY UNIVERSAL ELECTRONIC SEALER BY RCA



ANY CONFIGURATION of seal is possible. A metal "die" strip is bent to the shape desired. Evenly spaced holes in top platen permit easy clamping and fastening.

Makes any shape of seal in thermoplastics without the need of expensive dies

THIS IS IT! . . . a truly versatile sealer for thermoplastics. Seals plastic balls, pocketbooks, belts, or what have you . . . replaces solvents, cements, sewing machines, and heat-conduction methods.

You get electronic heating at its best—plus greater manufacturing diversity and lower cost. Even so-called "special" jobs can be put on a profitable "push-button" basis.

In concept, this machine's design is surprisingly simple. Gone is the need for expensive die shoes and costly time-consuming arrangements. A brass, copper, or steel strip serves as the die material. Bend it to whatever shape you want. Clamp it to the top platen and you are ready to go. To change "dies," replace the strip with the new shape desired. A stock of the "dies" you need can be easily made and interchanged at will.

When powered by an RCA 2-BH Electronic Generator, or similar high-frequency equipment, this sealer is capable of making "one-shot" seals having an area of from 7 to 15 square inches in from one to four seconds, depending upon the thickness of the material. The air cylinder, which drives the top platen, supplies sufficient pressure to seal 196 square inches (total platen area) if needed.

A ball-bearing coupling device permits the top platen to "float" and assures perfect contact with the work. Uniform pressure over the entire seal area is maintained; hot spots are eliminated.

Normally, the material to be sealed is placed directly on the lower platen. To speed loading and alignment—and to eliminate guide pins and key slots—copper-bottom trays can be easily made to hold the work. In the latter case the copper acts as an "electrode" surface.

This new RCA universal electronic sealer offers you a real opportunity to simplify your heat-sealing operations . . . boost production, slash costs. We'll be glad to send you complete "specs." Write Dept. 55-E.

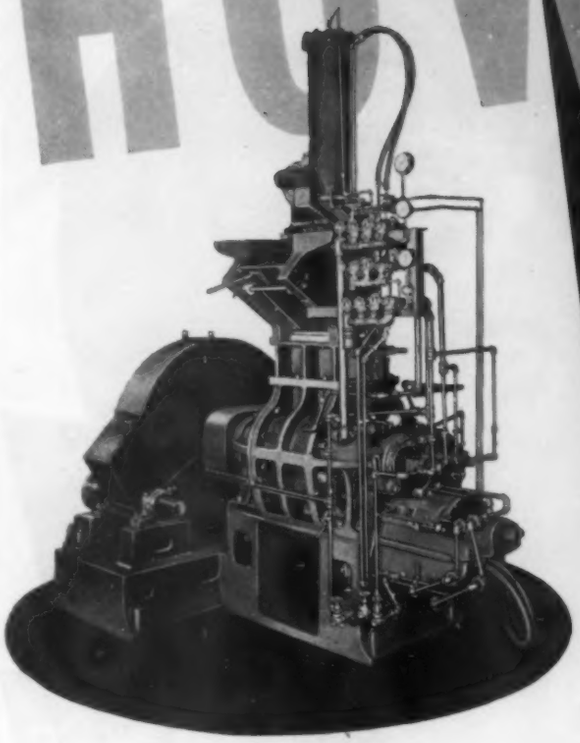
INDUSTRIAL ELECTRONICS

RADIO CORPORATION of AMERICA

ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal

HOW A BANBURY CHANGES MIXING FROM GUESSWORK TO CLOCKWORK

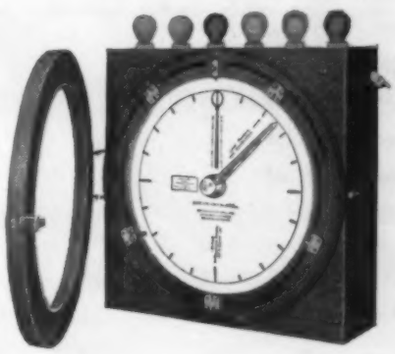


With a Banbury Mixer you can automatically produce batch after batch of uniformly mixed stock with clocklike consistency by following a simple, prearranged routine.

Once the proper sequence and timing of mixing operations for your particular plastic has been determined, the Banbury itself tells your operator what to do and when to do it. The result is standardized, uniform quality and higher production at lower cost.

HERE'S HOW ALL THIS COMES ABOUT—

THE TIMING DEVICE—A telechron-motor-operated timing instrument is mounted in full view of the operator. On the removable paper dials detailed information can be written, giving the operator complete mixing instructions for each stock. Graduated by minutes, the dial tells how long to allow for each operation, when to add ingredients and when to discharge the batch. The device automatically signals the operator as each stage of the operating cycle is completed by flashing one of a series of lamps on the instrument.



TEMPERATURE CONTROL—The sides, rotors and discharge door of the Banbury are cored for circulation of cooling water or steam. Valves for regulating the various circuits are arranged to put accurate control of batch temperature at the operator's finger-tips. An electrically actuated potentiometer pyrometer with its thermocouple in direct contact with the batch indicates and records the temperature on a chart, continuously.

Of the eight standard sizes of Banbury mixers, the one most generally used for plastics is the size 3A, illustrated above, having a capacity of 100 x specific gravity of the stock. For complete information send for Bulletin No. 180. FB-350

FARREL-BIRMINGHAM COMPANY, Inc.
ANSONIA, CONN.

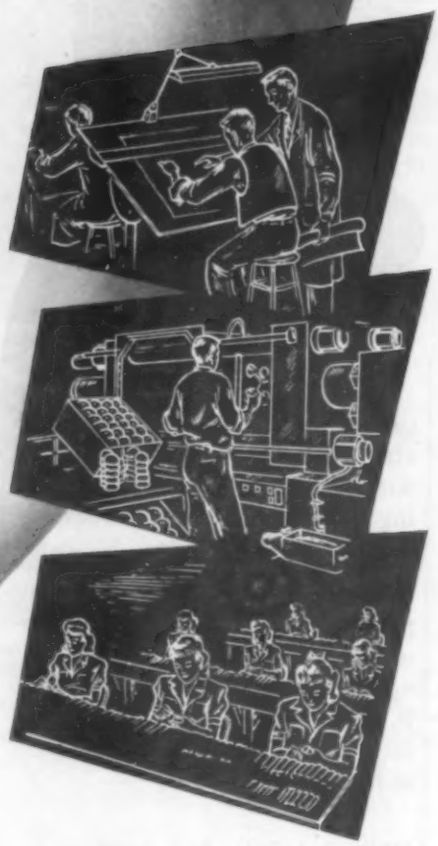
Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, Stonington, New York, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston, Charlotte

Farrel-Birmingham

One Obligation

To Serve You



Problems in product development are perennial. If you have such a problem, you may be open to suggestions in design, perhaps in the application of plastics economically produced on a volume basis. Scores of major manufacturers facing exactly these problems have welcomed Worcester Moulded's service and vast facilities.

We are the largest firm in Eastern United States devoted exclusively to custom injection moulding in plastics. We design and make our own dies and keep them in perfect condition to avoid costly delays. We inspect our production 100%, assemble the job when requested, and ship daily in quantities to meet your demand. For all practical purposes, our plant can well be a part of your own to facilitate the production of plastic parts that create greater profits in a competitive era. To serve you well is our sole business.

wmp

Custom Injection Moulding

WORCESTER MOULDED PLASTICS CO.

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130 West Chippewa St., Buffalo 2, N. Y.

Something's Hatching...

in this nest of mixing bowls

... and any four people will give you four different answers as to *what's* hatching!

The truth is that BAKELITE Polyethylene plastic is sharing in a great many new projects, new products, new designs throughout industry. This wonder-plastic, *so light it floats on water,* presents a rare challenge—so vast are its unexplored possibilities. Molded, extruded, or used in the form of tape, monofilament or thin film, BAKELITE Polyethylene is versatile and inherently superior in countless applications. It is non-toxic, odorless, tasteless ... *extremely* resistant to chemicals ... has an extremely low water vapor transmission coefficient ... can be heat-sealed ... can be made in any opaque or translucent color, or in natural.

There's scarcely a manufacturer, scarcely a designer who can't hatch up something to his profit from BAKELITE Polyethylene! Write Department CC-7 for complete information, technical data and formulations.

TRADE-MARKS

BAKELITE

POLYETHYLENE

BAKELITE CORPORATION, *Unit of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N.Y.

• ENGINEERED AND MOLDED AT NO. 1 PLASTICS AVENUE

Plastics make this camera click

● This Beacon camera makes a good picture—whether sitting for its own portrait or in the hands of a photographer. And it's focused on plastics. General Electric, at No. 1 Plastics Avenue, designed and molded the unit's four major parts for Whitehouse Products, Inc. of Brooklyn, New York.

Smart-appearing, compact, and light in weight, it's a camera that really clicks with the customers.

Do plastics fit into your picture? G. E.'s *complete* plastics service is equipped to design, engineer, and mold plastics to meet individual requirements. The results very often include short cuts in production or finishing that save money . . . new beauty or utility for products that can mean increased sales.

When you think of plastics, think of General Electric—the world's largest manufacturer of finished plastics products. *We'll be glad to send you, without obligation, the interesting illustrated booklet called, "What Are Plastics?"* Just write Plastics Division, Chemical Department, General Electric Company, 1 Plastics Avenue, Pittsfield, Mass.

G-E Complete Service—Everything in Plastics

BACKED BY 52 YEARS OF EXPERIENCE. We've been designing and manufacturing plastics products ever since 1894. G-E research works continually to develop new materials, new processes, new applications.

NO. 1 PLASTICS AVENUE—complete plastics service—engineering, design and mold-making. Our own industrial designers and engineers, working together, create plastics parts that are both scientifically sound and good-looking. Our own toolrooms are manned by skilled craftsmen—average precision mold experience, 12 years.

ALL TYPES OF PLASTICS. Facilities for compression, injection, transfer and cold molding . . . for both high and low pressure laminating . . . for fabricating. And G-E Quality Control—a byword in industry—means as many as 160 inspections and analyses for a single plastics part.

GENERAL ELECTRIC

CD47-A82

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